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SPINAL ANESTHESIA.

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There are two convenient methods of anesthesia, rectal anesthesia (N. R.), with oil-ether mitxure, and spinal anesthesia (R. A.). Their indications are not identical. One cannot operate upon the abdomen under rectal anesthesia, which distends the intestines, but spinal anesthesia contracts them and facilitates laporotomy. Spinal anesthesia is employed in three ways, (a) general, (b) high (abdomen, pelvis, upper extremity) (c) low (perineum, lower extremity).

For general spinal anesthesia, the method of Jonesco may be used, but I prefer that of Le Filliâtre, who injects 5 cgm. of cocaine, through the lumbo-sacral space, and recommends diffusion and withdrawal of 20 to 30 cc. of cerebro-spinal fluid. This method was of great service during the war, because it permitted operations on multiple wounds with a single injection. Thus, on the same patient, I performed a craniatomy and a resection of the elbow, and applied an apparatus to the leg. The analgesia lasts 60 to 90 minutes.

For anesthesia of the head and neck, and for the majority of my operations, the predominant *procedure was local and regional anesthesia* [1] For high and low spinal anesthesia, I use Corbières ampoules which contain two parts of procaine (novocaine) and one part of cocaine.

Indications. Spinal anesthesia is indicated in major operations on the abdomen, pelvis, and lower etxremities (amputation, disarticulation, resection of the knee, of the hip, of the thigh, high extirpation of the rectum, hysterectomy for cancer, gastrectomy for adherent ulcer, intestinal obstruction, etc.). In the last condition, (intestinal obstruction), spinal anesthesia improves the prognosis, because it causes intestinal contraction, relaxes the abdominal wall, and does not endanger the life of the patient from fecal vomiting, a result of narcosis.

As spinal anesthesia is less benign than local or regional anesthesia, I do not believe it should be employed for simpler operations in which local anesthesia suffices (hemorrhoids, varicocele, perineorhaphy, amputation of the foot, osteotomy of the femur, prostatectomy, craniotomy, goiter, cancer of the tongue, etc.).

Equipment: A 3 cc. syringe; 2 or three lumbar puncture needles with stilletes, and a short bevelled point; a glass graduate; tincture of iodine; ampoules of cardiac stimulants (oil of camphor, sparteine, or strychnine); ampoules containing the anesthetic powder to be dissolved in cerebro-spinal fluid.

Precautions. Plug the ears, bandage the eyes, maintain silence—useful preliminaries, but not essential. Inject subcutaneously, one hour before operation an ampoule of scopo-morphine and one of a cardiac stimulant.

Asepsis. Asepsis should be as perfect for spinal anesthesia as for a bone plastic. The fingers of the operator and the back of the patient should be iodinized. Sterile instruments and trays should be used.

Position of the Patient. The patient should be lying or seated; in the latter case the back is arched. For high abdominal operations (stomach, liver, kidney) the head and pelvis should be elevated, so that the middle of the back is in a lower position. In the case of an infant, it should be placed in such a position that the head and knees touch, bent like the arc of a circle, whilst the back remains in contact with the table. This position should be maintained for three or four minutes.

Puncture. Choose an inter-verterbral space, in the midline, dorso-lumbar, lumbo-sacral or between two lumbar vertebrae. For anesthesia of the upper abdomen, we advise dorso-lumbar puncture. For anesthesia of the perineum and lower extremities, lumbo-sacral puncture. The latter space is large, accessible in the median line, equidistant from the crests of the ileum, and the posterior inferior iliac spines. (Le Filliâtre).

Insert the needle in the midline slowly; at a given moment, a resistance is felt which gives way, the needle passes through the "dura mater" and penetrates the subarachnoid space. The fluid begins to flow. How much fluid should be withdrawn? If the tension is low, 10 cc., if it is high, withdraw 25 to 30 cc. into a graduate (Le Filliâtre). The first few drops should be permitted to flow into the ampoule containing the anesthetic powder; the powder is mixed and dissolved; if necessary it may be heated slightly to complete its solution.

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[1] Pauchet and Sourdat: "Anesthésie Régionale." Chez Doin, publisher, 1918.

How much anesthetic should be injected? For anesthesia of the stomach and liver, use an entire Corbière ampoule. It contains 6 cgm. of procaine and 3 cgm. of cocaine. The anesthesia ascends to the neck, and lasts an hour and a quarter. The dose should be judged in proportion to the severity of the operation. It should be weaker for the stomach than for the kidney, weaker for the uterus than for the stomach, and still weaker for the thigh, foot, or perineum. In the latter case, with lumbo-sacral puncture 1/3 of an ampoule is sufficient.

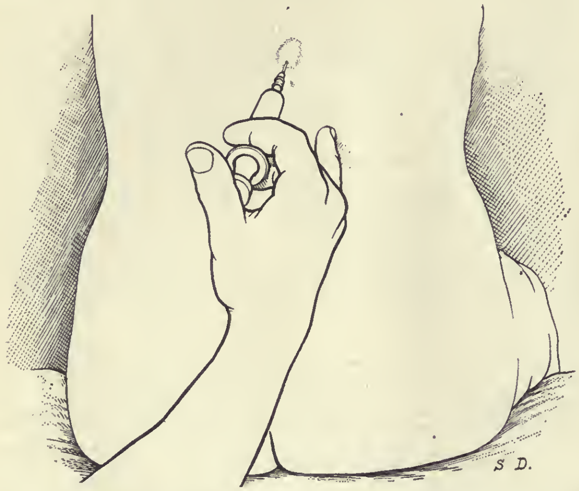

Fig. 1—Dorso-Lumbar Spinal Anesthesia. Injection of the "button" of skin. In order to avoid the pain due to spinal punctures, the operator infiltrates the skin with ½% procain and the tissues which form the tract of the puncture, up to the vertebral column. In this way, it is possible to use a large needle, without causing pain.

Technique of Injection. Fill the syringe with 3 cc. of the prepared solution (anesthesic powder dissolved in cerebro-spinal fluid). Inject the liquid slowly. Aspirate the cerebro-spinal fluid, reinject and withdraw two or three times so as to complete the diffusion in the spinal canal. Make the patient cough in order to encourage the diffusion of the fluid. The injection should occupy several minutes.

Errors. (a) There is no flow of cerebro-spinal fluid, because the needle has penetrated a nerve, or the epi-dural space, or a fatty mass. Insert the stillete, withdraw the needle about 1 mm. or push it in further. If in spite of these maneuvers the fluid does not flow, begin again in the space above or below, but not in the same one.

For the second puncture, use another needle.

(b) There is a flow of blood. Replace the stillete, push the needle forward or backward. If blood still flows, take another needle and puncture in the space above or below.

(c) The fluid flows too slowly. The opening of the needle is engaged in the dura mater. If one injects now, the solution remains in the epi-dural space and the patient is poorly anesthetized. Puncture in the space above or below with another needle.

(d) The anesthesia is nil or incomplete. The injection has been made into a vein, or into the epi-dural space, or the solution of the powder in the cerbro-spinal fluid has not been completed.

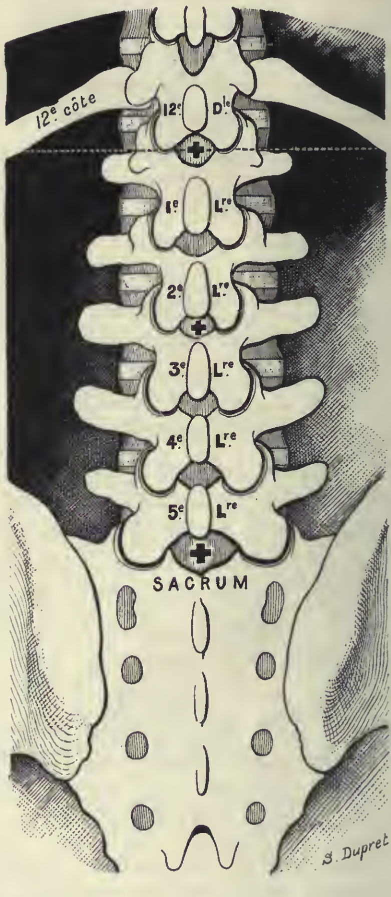

Fig. 2—The three points (black crosses) where lumbar puncture should be performed.
(1) dorso-lumbar puncture, outlined by a transverse line uniting the lower borders of the twelfth rib.
(2) median lumbar puncture, between the second and third lumbar vertebrae.
(3) lumbo-sacral puncture (Le Filiâtre); this presents the largest space.
These three punctures are made in the median line.

Accidents. (a) Retention of Urine. This may last several days.

(b) Vomiting. This is rare after the operation. Should it occur during the operation, apply cold compresses to the neck. (Walther).

(c) Sciatic Neuralgia. This occurs when puncture is made outside of the median line. It never lasts.

(d) Headache. A frequent occurrence. Give antipyrin. If violent, perform a lumbar puncture. Violent headache is rare with good technique.

(e) Anal incontinence, during the operation. The patient has involuntary defecation. This is troublesome in total abdominal hysterectomy as the feces may get into the vagina. The nurse should be instructed not to give an enema on the morning of the operation, to tampon the vagina, to purge the patient two nights before the operation, instead of the evening before, to give fluid diet from the time of purgation up to the operation.

(f) Asphyxia, from bulbar inhibition. The anesthesia may ascend sufficiently high to paralyze the respiratory center. If the patient is conscious, tell him to blow, or make him talk without stopping. As soon as the puncture is finished, instruct an assistant to tell the patient to breathe deeply for five minutes through the nose.

We have seen three cases of bulbar inhibition, it was necessary to employ artificial respiration, for ten to fifteen minutes. Paraplegia and ocular palsy are rare and only transitory.

I do not think this accident is possible, if the puncture is made according with the aforementioned precautions.

(g) Death. Deaths are rare, but may occur as with chloroform. Spinal anesthesia, is neither more nor less dangerous than chloroform anesthesia. Patients suffering from shock, or enfeebled by infection, tolerate spinal anesthesia badly.

I consider spinal anesthesia as a convenient method, which improves the prognosis in a large number of operations, but which entails as many risks as narcosis. The sugeons who encounter no complications are those who apply it with a ritual regard for detail, and who do not attempt to use it in shocked or enfeebled patients.

In conclusion, spinal anesthesia, presents some immediate dangers, almost negligible. But, it has no untoward action on the lung, liver, or kidneys. It allows severe traumatizing operations to be performed with minomal shock, such as resection of the hip or amputation of the thigh, in wounded soldiers. It lessens the danger of major abdominal operations, because it contracts the intestines, relaxes and quiets the abdominal wall. Hysterectomy for uterine cancer, laparatomy for acute intestinal obstruction, are performed with greater ease, and with less danger, under spinal anesthesia, than under general narcosis.

This method has gained ground during the last few years, and will gain more every day.

SOME APPLICATIONS OF SPINAL ANESTHESIA.

Abdominal Hysterectomy. We shall refer only to abdominal hysterectomy, because vaginal hysterectomy even when associated with a vagino-perineal incision which gives very wide exposure, may be performed under trans-sacral anesthesia.

For abdominal hysterectomy (for fibroids, salpingitis, and especially for uterine cancer), spinal anesthesia is certainly the best. It can be employed as follows: according to the method of Le Filliâtre, (5 cgm. of cocaine by the lumbo-sacral route, in the large space which separates the fifth lumbar and first sacral); or a mixture of procaine and cocaine (1/4 of cocaine and 3/4 of procaine), injected between the third and fourth lumbar vertebrae, or between the twelfth dorsal and first lumbar.

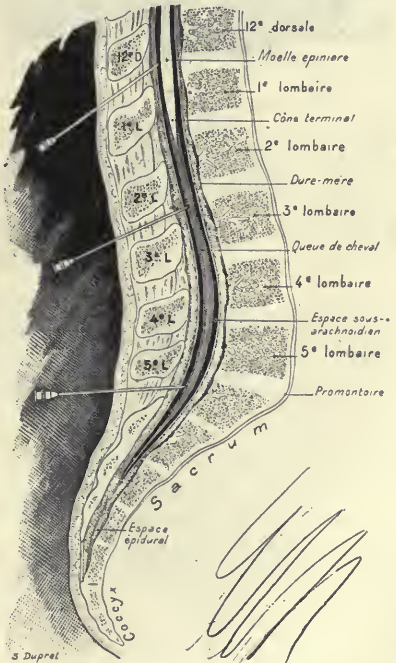

Fig. 3

Fig. 3—The three points for lumbar puncture.

(1) Dorso-lumbar, the needle is held slightly obliquely upwards in order to enter the spinal canal; stop as soon as the fluid runs, so as not to penetrate the cord. This, however, is not dangerous as long as no fluid is injected into the cord. Such injection might dissociate the nervous structures. High injection is useful for operations on the stomach and thorax. Make the patient cough, aspirate and inject several times in order to insure good mixture of the cerbro-spinal fluid and the procaine. In this manner very high anesthesia may be obtained, particularly if care is taken to withdraw 15-20 cc. of fluid, in advance.

(2) Median-lumbar. At this level, there is no more cord, but only the cauda equina.

(3) Lumbo-Sacral. Here there are only nerves. At the midline there will not be a single nervous filament. This is the safest place to inject, if the puncture is made exactly in the midline.

In dorso-lumbar injection, care must be taken not to push the needle too far, so as not to pierce the cord; the accident will cause no great inconvenience as long as the operator does not inject the solution, until the cerbro-spinal fluid flows; fluid will not flow as long as the needle is in the cord

In order that the spinal anesthesia be effective, a complete diffusion of the anesthetic product is necessary. This is obtained by asperating the fluid and reinjecting it at definite intervals. The contact between the spinal roots and the anesthetic mixture takes place in the sub-arachnoid space.

For a uterine fibroma, an operation lasting usually from 20 to 45 minutes, a simple spinal anesthesia is sufficient, using the whole of one of Corbière's ampoules (6 cgm. of novocaine, and 3 cgm. of cocaine). The anesthesia is perfect and lasts at least one hour. If the surgeon wishes to inject a smaller quantity, he can infiltrate the abdominal wall as for uterine cancer.

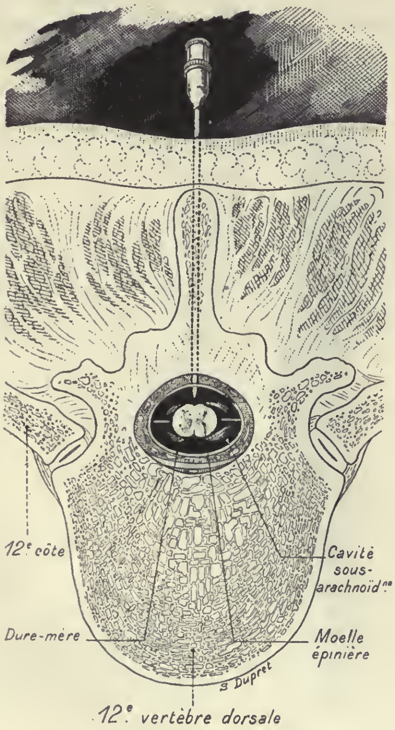

Fig. 4—Dorso-lumbar punctures, made exactly in the mid-line, between the 12th dorsal and first lumbar. There is sufficient space between the meninges and the cord. The needle should stop as soon as fluid flows, so as not to puncture the cord.

For Cancer. Hysterectomy for uterine cancer requires a good deal more time than for fibroma (50-80 minutes). For this purpose, simple spinal anesthesia may not be sufficient; local anesthesia of the abdominal wall may be used along a line from the umbilicus to the pubis. For this purpose use hydrochloride of quinine and urea, which has the advantage of giving a prolonged anesthesia (several days), so that the patient during recovery from the anesthesia, experiences no pain. These post-operative pains are often excited by vomiting, coughing, or movements. A 1% solution is used. The sheath of the rectus is first infiltrated over an area the width of the thumb. The subcutaneous cellular tissue is also infiltrated.

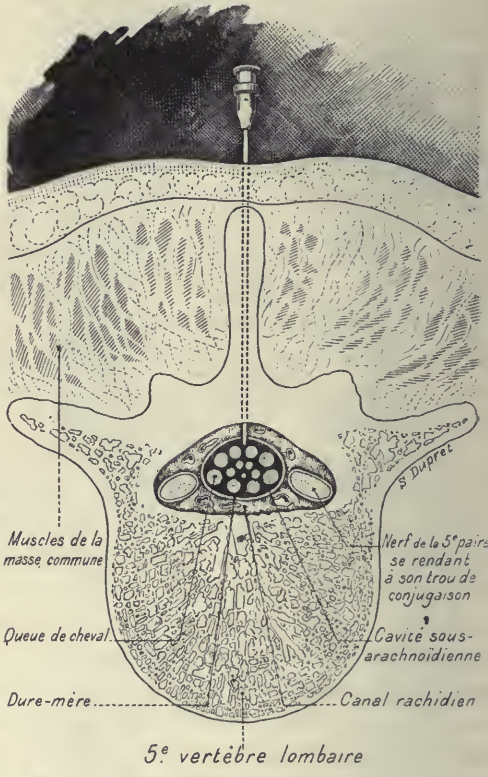
Muscles de la masse commune
Nerf de la 5ᵉ paire se rendant à son trou de conjugaison
Queue de cheval
Cavité sous-arachnoïdienne
Dure-mère
Canal rachidien
S Dupret
5ᵉ vertèbre lombaire

Fig. 5—Puncture in the lumbo-sacral space. Here there are no nerve filaments in the midline. This space is the largest and safest to puncture.

The patient should be warned that, the cicatrix of the skin may be indurated for several weeks or months; this is the effect of the quinine, but it is not permanent. The patient should be instructed to mobilize the indurated skin with her fingers, in order to soften it. The injection of uro-quinine is agreeable to the patient, for it prevents post-operative suffering for several days. Its use is also recommended in certain very painful operations like tonsillectomy, and operations on the anus (hemorrhoids, fistulae). It will prevent suffering.

Surgeons who prefer general anesthesia to spinal anesthesia for Wertheim operations are wrong; for the dangers are the same as in either case, while the operation under the latter is easier, and can be performed better because of the abdominal "quiet," the relaxation of the abdominal wall, and the fact that the patient does not push out her intestines. The operation can be performed better, and the patient recovers more rapidly.

I can comprehend why surgeons may use ether or spinal anesthesia, indifferently, for uterine fibroids, but for uterine cancer the advantage belongs to spinal anesthesia, which has a lower mortality, because the operation can be performed with greater ease and perfection.

Intestinal Obstruction. In a patient suffering from acute intestinal obstruction, for several days, the abdomen is distended and tense; do not perform a laparotomy. The loops of intestine are distended and manipulation would be dangerous; the pressure of the fingers and packings might tear the intestine denuded of its serosa and favor the onset of peritonitis. There is, however, one exception, valvulus of the sigmoid; here the entire involved intestine should be delivered, an artificial anus will not suffice. The sigmoid is untwisted, marsupialized, fixed to the abdominal wall, and the loop cut immediately or two or three days later. At a second operation the artificial anus is closed.

In cases where artificial anus is not indicated, as for example in an abdomen which is not distended, and in which the obstruction is recent, in which the diagnosis is made by the colic and visible peristalsis, followed by borborygma, perform a median laparotomy to relieve the obstruction. This operation may be done under spinal anesthesia. Spinal anesthesia has the following advantages in these cases.

1. The patient suffers less from intoxication, the anesthetic being rapidly eliminated. The kidneys are not affected, neither is the liver.

2. Spinal anesthesia induces intestinal contractions, and the intestines are small instead of being distended.

3. The abdominal wall is soft, relaxed, and exploration is thereby rendered very simple.

4. Fecal vomiting is avoided during the operation, a complication which may lead to immediate or later death from aspiration pneumonia. This accident is avoided, particularly if the stomach is washed before operation (an indispensable precaution).

Abdominal Operation for Carcinoma of the Rectum. When the cancer is situated low, at the level of the ampulla of the anus, in other words when it is necessary to sacrifice the anus, the operation is performed by the sacral or perineal route. For this, trans-sacral anesthesia is sufficient. However, when the cancer is situated above the ampulla of the rectum, particularly if it reaches the sigmoid, a laborotomy is necessary. The entire descending colon must be mobilized, with incision of the fascia, the inferior mesenteric artery is freed, a band of mesentery 3 cm. in with is left along the length of the descending colon, and a long loop of intestine extirpated, up to a point where the gut seems free from cancer, healthy and well nourished. For this operation a relaxed and quiet abdomen is essential. It is performed best under spinal anesthesia. The pulmonary complications of ether, and the hepatic and renal complications from chloroform need not then be feared. The patient recovers quickly. For cancer of the intestine, as for cancer of the rectum it is advisable to infiltrate the abdominal wall with quinine and urea hydrochloride which insures a prolonged anesthesia.

THE USE OF PROPYL ALCOHOL AND SOLUTIONS OF CERTAIN DYESTUFFS IN PROPYL ALCOHOL IN SURGICAL THERAPEUTICS.

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The hydrating action of alcohol in general has long been known. Thus wood alcohol (methyl alcohol) combines with two molecules of water; grain (ethyl) alcohol with four; propyl alcohol with eight; butyl alcohol with sixteen; amyl alcohol with thirty-two, etc. Up to date only ethyl alcohol has been used in surgical technique and principally as a disinfectant of the hands (Ahlfeld). Its albumin-precipitating properties are well known and Beyer thinks that its therapeutic action depends upon its poisonous properties but that its poisonous property is counteracted by the hygroscopic property of the alcohol. The precipitation by alcohols of albuminous materials depends upon the presence of salt, (Fischer) and when alcohol acts upon bacteria (in a watery medim) it causes a precipitation in the bacterium and thus kills it.

Tests have proved that 16% propyl alcohol kills bacteria quicker than 24% ethyl alcohol or 32% methyl alcohol, but there is another factor that determines the killing action and that is the surface tension of the alcohol in question. Traube and Czapek have shown, that in undiluted conditions, the surface tension is very low and if it is added to water, the surface tension of this is much reduced. All questions of osmosis and narcosis depend on this surface tension. The surface tension is calculated by means of the usual stalagmometer. (Either the Traube or the Amann stalagmometer can be used). If the tension of propyl alcohol in water (1 in 3) is equal to 0.4, then the stalagmometer with this mixture yields 240 drops of a 25% propyl alcohol at 15° C. etc., etc.

Czapek has proved that for a number of substances the surface tension must be 0.68 in order to enter into the interior of the living cell and kill it. This question of surface tension is of the utmost importance as it explains hemolysis according to the investigations of Fuhner and Traube.

The surface tension of the erythrocytes is about 0.6; of the yeast cells about 0.5 and Christiansen calculates that of bacteria to be about 0.4 and that of spores to be about 0.3. The surface tension should be carefully studied where intravenous injections are practiced.

The low number, 0.3, explains why alcohol does not kill spores even by long contact. Extensive studies of the surface tension have been made by Ducleaux, Traube, Kirch, Ramsay, and Christiansen.

Wirgin draws the conclusion that propyl alcohol is the deepest acting and that no kind of alcohol exercises disinfecting activity on a dry obpect in undiluted condition. Christiansen has shown that at 25° C., the time consumed for disinfection is one-half minute with a surface tension of 0.45 for methyl alcohol; with 0.43 for ethyl alcohol (acetone has 0.42).

Of all the alcohols only propyl alcohol disinfects at as low temperatures as 0° in a dilution of from 30% to 100%. As said before, alcohol kills bacteria only in moist condition. At the proper surface tension on entering into the bacterium and aided by the salt in the protoplasm, this is precipitated; but the alcohol also draws on the water from the protoplasm, which fact may save the life of the bacterium. That propyl alcohol kills even at 0° indicates that the water absorbing action takes place so quickly that it overshadows the protective one. The precipitation of the protoplasm in the bacterium depends, as already mentioned, upon the amount of salt present, but Kruse has proved that spores are poor in salt and hence alcohol will not kill them as it will bacteria. Saul killed spores by boiling them with 30% propyl alcohol. As the surface tension of spores is very low (0.3) and that of the propyl alcohol (25%) is 0.4, the propyl alcohol is unable to reach the interior of the spores. The disinfecting property of the alcohols depends upon the surface tension. At the proper tension propyl alcohol disinfects four times better than ethyl alcohol and dissolves the fat on the skin. Propyl alcohol painted on the skin is quickly absorbed and is furthermore non-poisonous. It is, however, first in dilutions higher than 35% than it is hygroscopic (one molecule propyl alcohol mixes with eight molecules of water.. The disinfecting concentrations of propyl alcohol is thus below 35. The higher alcohols, like butyl, amyl, etc., are but little soluble in water. The experiments demonstrate that propyl alcohol is admirably adapted for skin disinfection, as it has a low surface tension and can mix easy with water and lipoids; yet its surgical use up to date has been but little utilized. Saul sterilized surgical sponges by boiling them with 30% propyl alcohol.

Of other investigators over the use of alcohols for sterilizations must be mentioned Buchner, Fuchs and Wirgin. Concerning propyl alcohol, it must be remembered that it loses its disinfecting properties if mixed with more than four times its volume of water (different surface tension coefficient). The value of alcohols depends upon their ability to penetrate the layer of fat on the skin, and in which bacteria are found, and their ability at the same time to kill the bacteria, all of which, as already said, depends upon a low surface tension and great ability to combine with water and lipoids. Fifty per cent. propyl alcohol is thus a better cleanser of the skin than a 2% solution of silver nitrate.

Ethyl alcohol has been used extensively in surgery and its best action seems to come from a 70% solution but if diluted with the natural fluids in a wound it loses its penetrating properties and if used in higher concentration than 70% it is painful and precipitates the albuminous substances. (Phul, Wohl). Christiansen also examined the action of serum in relation to propyl alcohol; a 24-hour old bouillon culture of staphylococcus pyogenes aureus was mixed with three volumes of horse serum, and to one ccm. of this mixture (in two test tubes) were added equal parts of a 50% and 70% propyl alcohol.

In one minute and at 20° C. all the bacteria were killed; nitrate of silver gave the same result under identical experimentation, but one per cent. silver nitrate and ethyl alcohol in any concentration did not kill the bacteria as quickly. The best propyl alcohol appears to be that of Kahlbaum (n-propyl alcohol); in this country Eimer & Amend Co. of New York furnishes an equally good product.

The fat-removing property of the propyl-alcohol we have employed in hand-disinfection. The hands are scrubbed with ordinary sterilized bristle hand brushes, using warm water and green or Castile soap, using several brushes for one scrubbing. Now apply 50% propyl-alcohol to the subungual space, followed by 25% propyl-alcohol. Finally the whole hand is rubbed with 50% propyl-alcohol. This leaves the skin in a dry, but smooth condition. Following this method we have operated without using gloves upon a large number of patients, without any trace of infection whatever, using both silk and catgut for ligatures and sutures. Bevan, in his "General Surgery," mentions the test of Haegler, using liquid Chinese dye to test thoroughness of the sterilization. Apparently the most delicate cutis can tolerate the use of the propyl-alcohol in the strength here employed and the author and his helpers have used it with always good results in even the dirtiest cases imaginable.

The best result in wound treatment has been obtained with 25% propyl alcohol.

The author having used the various dyestuffs in wound treatment for a number of years, thought of suspending the dyestuffs in 25% propyl alcohol and has used it many times in single solutions as for example 2% malachite green with or without the addition of an equal amount of mercuric chloride (1% or 2%) in 25% propyl alcohol. The malachite in propyl alcohol without the addition of the mercuric chloride seems to act equally well. Tildes had previously employed these chemicals dissolved in 80% ethyl alcohol. The mixture of the mercuric chloride and the malachite green forms a double compound of one molecule malachite and two molecules mercury; this forms a leucocompound which becomes invisible in the wound, but becomes invisible in the wound, but nevertheless acts and maintains its activity.

Besides malachite green, other members of the *diamidotriphenylmethane* group (brilliant green) were suspended in 25% propyl alcohol and employed (Ehrlich) in the treatment of infected wounds (Dakin, Browning). We have also tried the fuchsines in a similar manner as the crystal violet and methyl violet (Dryer); our observations have been that infected wounds treated with propyl alcohol or certain dye stuffs dissolved in propyl alcohol heal quicker than when the Carrell-Dakin (hypochlorite) or other methods had been employed. Especially in cutaneous infections excellent results were obtained with fuchsine suspended in propyl-alcohol. Propyl alcohol has been employed in dentistry to rapidly disinfect root canals; and it acts rapidly on account of its dehydrating properties.

In many cases of fistulas of long standing, the propyl alcohol aided decidedly in establishing a rapid cure, by first painting the track with 50% propyl alcohol, followed by a solution of malachite in 25% propyl alcohol; when dry fill up the fistula with Calot's mixture to which a small amount of malachite green had been added.

Several cases of purulent pleurisy were treated with puncture followed by injection through the trocar of an ounce or more of a solution of methyl violet in propyl alcohol, the process being repeated some days later, if conditions demanded it. On many occasions only one single puncture was needed and seldom more than three punctures.

Several cases of infection of the knee joint were treated by free evacuation of the fluid, washing the joint cavity with ether, and finally injecting a small amount of suspension of methyl violet in 25% propyl alcohol and dressing the wound without drainage. One case of infection of the knee-joint following a penetrating bullet wound from a Mauser rifle was treated by simply removing the fluid with a small trocar and injecting methyl violet in propyl alcohol through the same trocar; no ether could be had at this moment; the wound was dressed without drainage and the patient recovered with a useful joint.

Another case of interest is that of a soldier with an infected wound after a bayonet thrust through the arm and fleshy part of the chest, which had resisted the hypochlorite method of disinfection for more than three months; the wound was treated with a suspension of malachite green in 25% propyl alcohol; on other days with plain 25% propyl alcohol, while the skin around the wound was painted with 50% propyl alcohol. In less than two weeks the suppuration was under control and the remaining fistula was filled with Calots mixture; the fistula closing under one dressing. The author has treated several hundred cases of infected wounds of greater or lesser severity. but which could not be enumerated in an article like this, where the results have been so strikingly good and the time saved in disinfecting wounds by this method is considerable, that he deems the method worthy of general use.

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MODERN METHODS EMPLOYED IN THE TREATMENT OF GAS BACILLUS INFECTION.*

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In a paper read before this society in 1912 I reported eight cases of gas bacillus infection—three occurring in the work of J. M. Wainwright, five occurring in my own work. In this paper it was pointed out that while gas bacillus infection was comparatively a rare disease, it might happen after any injury; but that the type of wound it was most likely to develop in was the crushed one in which there had been destruction of tissue and interference with the blood supply from injury to the vessels. Attention was also drawn to the extremely short incubation period between the injury and the appearance of the infection. The importance of early recognition and prompt treatment before the development of the toxemia was emphasized. The appearance of the wound having such infection, and the thin bloody discharge with the characteristic sweetish, pungent foul odor were described, and I urged that the surgeon dress and inspect these wounds himself so that the infection would be recognized and combated early should it develop.

Two plans of treatment were outlined in that paper—the preventive and the treatment of the infection itself. In the preventive treatment, I suggested that, after a thorough removal of all injured tissue, the wound be well washed out with an oxidizing solution — potassium permanganate — that the flaps be left open, and that the wound should be inspected by the operator at least twice a day; that, in case of amputation above the crush, the same treatment be carried out—the flaps should not be sutured until the danger period had past which we considered to be five to seven days. If there developed any sudden rise of temperature soon after the operation, or if the patient became restless and complained of pain out of proportion to the amount the operation should have caused, the likelihood of a beginning of gas bacillus infection was to be considered. Wounds having gas bacillus infection upon admission or developing it afterward were treated by the conservative method outlined by Cramp, which planned to reduce the high mortality that attended amputation, and to save limbs if possible. It consisted in multiple free incisions to relieve tension and allow the gas to escape, washing the wound well with permanganate solution, discarding all dressings and using a continuous drip of permanganate solution with supportive measures.

The discussion revealed that this infection was extremely rare in the work of the members of this Society and I was led to believe that the infection was endemic to certain soils—especially those richly fertilized. The correctness of this belief is well borne out by the prevalence of gas bacillus infection on certain war fronts, and its rarity or absence upon others. Army reports show that the infection was not common on the Russian front where mobile warfare in the lake and forest countries was fought; it was comparatively rare on the Italian front where mountain warfare was fought, but was exceedingly common in the trench warfare in France and Belgium, whose soil was rich from years of intensive fertilization.

The war has added much to our knowledge of the infection which the surgeon may use to advantage in his work, for our crushing wounds in railway surgery resemble very much those caused by high explosives and if we will follow the doctrines laid down by these heroic army surgeons our results in the future should be much better than they have been in the past.

While, as is known, the *bacillus aerogenes capsulatus* is an anaerobic bacillus, oxidizing solutions will not destroy it if there is devitalized dead tissue in the wound—neither will the strong antiseptics or the actual cautery advocated in the beginning of the war. It has been definitely proven that dead tissue is essential to the growth and welfare of the organism and because of this fact the modern methods of prevention and of combating the infection have been planned.

It was in the tearing, crushing types of injury by high explosives that gas bacillus infection commonly developed, and much less frequently in the clean cut wounds of machine and rifle bullets.

Early and thorough débridement—the removal of all injured tissue, skin, subcutaneous tissue, fascia, parts of muscle, muscles entirely, from the origin to the insertion, or groups of muscles, large sections of bone or bones, the inspection of the blood supply to the part to determine the amount of injury to the vessels—practiced by those skilled in its employment was essential in the treatment of these wounds, with primary or secondary suture depending upon the length of time which had elapsed between the receipt of the injury and the operation, and the individual skill of the operator. Wounds infected at the time of operation were best treated by delayed suture and in the interval, through gaping flaps, a continual drip of Dakin solution was employed. In performing débridement an anatomical dissection should be made. It can best be done by sharp dissection, and all rough handling and blunt dissection should be avoided. It is not always necessary to remove large areas of skin and the subcutaneous tissue, but the muscles should be removed extensively if they show evidence of devitalization—this is indicated by hemorrhagic infiltration and the failure to contract or bleed when pinched or cut. Dean Lewis describes a muscle which is apt to be the seat of gas gangrene as having a waxy appearance, looking somewhat as if it had been boiled. These muscles should be widely removed but the tendons should as a rule not be divided. "It is surprising," says Lewis, "how little disability follows extensive débridement, if it is anatomically performed."

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* Read at the twenty-ninth annual session of the New York and New England Association of Railway Surgeons, held at the Hotel McAlpin, New York City, October 20, 1919.

Wounds having gas bacillus infection were treated by wide excision, delayed closure and irrigation by Dakin solution, the real worth of which was found to be its dissolving action upon clots, its separation of sloughs and its mechanical cleansing rather than upon its antiseptic properties. The *x*-ray was used to detect collections of gas in the muscle sheaths and fascial planes far remote from the site of infection and proved its worth in finding such collections which had been overlooked at the time of operation. The question of amputation depended upon the condition of the patient, the extent of the infection, its proximity to the body and whether or not the infection could be controlled by conservative measures.

Van Beuren gives the following general rules for the treatment of gas bacillus infection:

(1) Operate as early as possible under nitrous oxide oxygen anesthesia, if you can.

(2) Prepare the part with the least amount of trauma and delay.

(3) Avoid tourniquets.

(4) Make incisions longitudinally and half again as long as you think they need be both in skin and fascia, but leave as much skin as you dare in your débridement.

(5) Go between rather than through normal muscles, but open the wound as thoroughly and as freely as you possibly can.

(6) Excise all torn, crushed, discolored, noncontractile muscle until you have left only that which is firm, or normal color, actively contractile and which bleeds readily.

(7) Make a careful search for and remove all loose bone and foreign bodies, especially clothing and blood clots.

(8) Stop all bleeding and leave the wound well open and separate its walls with wet gauze laid in, not packed in.

(9) Use Carrel tubes, plenty of dressings and make careful splint fixation.

(10) Do all this as rapidly as you can.

The sera prepared by Sacquepee, Weinberg and Bull, in the early part of the war did not prove to be effective, but there is yet hope that an antitoxin will be found that will combat the toxemia as effectively as the toxemia of tetanus is controlled by the antitetanic serum.

The lessons that those who practice surgery in civil life may learn are many. Gas bacillus infection instead of being a rare disease is now known to be quite common—the crushing injuries, with great loss of tissue and interference with the blood supply to the injured part, contaminated by soil and clothing are the types of wounds the infection is most likely to occur in, but we should remember it may be met in any wound. (It has been reported in post-operative wounds, after subcutaneous injections, obstetrical operations, animal bites, and goring of animals.) These wounds should be treated by removing all devitalized tissue and traumatized tissue which may die later. Muscles should be cut away until the color and the bleeding from the edges of the parts to be left should lead us to believe that that remaining part is viable. All splintered, shattered bone or bones should be removed and the blood supply to the part should be inspected. Delayed closure is the safest method to employ. Let us pin or sew back our flaps, use hypertonic salt solution or Dakin solution and wait at least a week before closure, or if we are treating an already badly infected wound let us wait at least eighteen days or longer before closure, being guided by bacterial counts and cultures for streptococcus and, what is equally important, by the condition of the patient.

The tourniquet if wrongly applied or left on for an indue length of time will traumatize the main vessels and interfere with the circulation to the injured part. May I urge you to instruct your first-aid teams and assistants again in the proper application of the tourniquet — to emphasize its dangers and to operate yourselves without its use if it can possibly be done.

Gas-oxygen anesthesia has proven itself to be safer than ether, but there are times when spinal anesthesia will be found to be safer than gas and oxygen in operating upon serious injuries of the lower extremities.

With the substitution of the ballast road bed for the dirt, the number of intelligent first aid teams and well equipped hospitals along our railway systems, with the knowledge of the importance of early and thorough débridement with removal of all foreign bodies and with the use of Dakin's solution and delayed closure, gas bacillus infection should be a rare complication in our work in railway surgery; but let us remember it is likely to occur in the work of any of us. It is important that these cases should be watched and treated by the operating surgeon and not by his assistants in order that should gas bacillus infection occur it may be recognized early and combated intelligently.

A METHOD FOR THE TREATMENT OF BURNS WITH BLEB FORMATION.

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The object in the treatment of extensive burns of the body is to overcome shock, limit the amount of pain, prevent toxemia, shorten the time of convalesence and prevent infection. The treatment of surgical conditions of this kind, regardless of whether the etiology has been physical, chemical or electrical, has always been most difficult from the standpoint of obtaining an early satisfactory result. It is true that with our most modern methods of treatment the mortality and morbidity have been lessened and the period of convalesence greatly shortened.

The surgeon has passed through a cycle of therapy in the treatment of lesions of this type, including the vegetable lotions used by our forefathers, and the application of various kinds of ointments and lubricating lotions, some impregnated with chemicals and others without. Unfortunately I believe a great many of the profession still persist in the use of remedial measures of this kind, a procedure that does not indicate progress. The most recent method and what has probably proven to be the most satisfactory is the use of the aqueos solution of chemicals, especially the use of a solution of sodium bicarbonate or the application of one of the many paraffin formulas in the form of the spray. The use of these most recent methods has been a great step forward in bringing about an early and satisfactory result in the treatment of burns.

In a burn of any degree in which the structures are not completely destroyed the reaction is manifested by an exudation beneath the epidermis with the formation of bullae or blebs. The chemistry of this serum is probably different from that of the blood plasma and from that of bullae or blebs present in inflamatory conditions other than burns. It is true that the serum is one of the manifestations in the composite picture present in any inflamatory condition, the quantity depending solely upon the severity and extent of the burn. Whatever the change in the chemistry of the serum from these blebs may be whether due to a change in the inorganic salts or the addition of higher compounds brought about by the destruction of the proteid elements of the cells, it suffices to say that the absorption of this material is a very important factor in the toxemia that accompanies burns of severe degree. The great pain and the consequent consumption of a large amount of nerve force is probably very important in the formation of shock.

Any method which has a tendency to prevent or overcome the dangerous elements of shock, toxemia or infection must meet with the approval of the profession. The procedure we are advocating and about to describe has proven in our experience to warrant this belief and certainly is worthy of trial. The technique was first used by one of us (Mangan) in France and it has proven so satisfactory that one of us (Ziegelman) has utilized it in a few cases in civil practice and with most excellent results. At first we felt that its virtue depended upon the fact that the first cases treated were burns due to chemical agents but this belief was rapidly dispelled after using it for burns due to physical forces; and we have come to the conclusion that the etiological factor is of very little importance.

The method and technique is based upon the use of sodium bicarbonate which has given such excellent results in the hands of so many surgeons these last few years. The procedure is called by us the modified sodium bicarbonate method, since it is only applicable to burns with bullae or bleb formation, and is as follows:

A fair-sized needle, attached to a large record or similar syringe, is inserted into the bleb at its most dependent part and the fluid content of the bleb is withdrawn if possible. In large bleb formation several syringefuls may have to be removed. After all the serum possible has been removed the syringe is filled with a four per cent. solution of sodium bicarbonate and this is injected into the bleb until the latter is entirely filled with the solution. In certain cases the serum cannot be aspirated and it is then necessary to inject the sodium bicarbonate solution into the bleb, allowing it to mix with the contents and to remain in that location for a few hours, when one will find that the combined material in the bleb can be easily aspirated. After the fluid has been withdrawn—that is either the pure serum or the admixture of serum and sodium bicarbonate solution—the bleb is filled with the chemical solution and it is allowed to remain for a period of from four to eight hours when the procedure is repeated. In severe cases this process is repeated several times. Great care should be exercised in order that the skin covering the blebs is not broken in aspirating or when the dressings are removed if dressings are necessary. To prevent the dressings from becoming adherent to the loose surface of the blebs it was found necessary that "ambrine" or paraffin gauze be used as this material gave by far the best results. When the secretions have ceased to form, a fine dusting powder, preferably zinc oxide, is used to cover the surface. In from five to eight days the epidermis in the form of dry scales is easily removed leaving a healthy dry surface giving the appearance of a sunburn.

By using this method we have found that the period of convalesence has been greatly shortened and that the dangerous elements so prone to occur with burns has been diminished. We have had no case of infection follow this method and though the number of cases is exceedingly small we believe that the incidence of this complication has been greatly lessened.

A CASE OF SEVERE LYMPHANGITIS OF THE ARM

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White Plains, N. Y.

The patient, a married man of about forty-three years, was first seen March 1, 1919. He was well nourished, though his color was pasty and his eyes lacked lustre. This had been his usual appearance for several years past.

When he presented himself on the 1st day of March he had a carbuncle on the back of his forearm a little above the wrist. The trouble had started a few days before. The infected area was about the size of a twenty-five cent piece. It had not yet come to a focus, and as it is usually my custom to wait before incising for a separation of the slough, which corresponds in point of time to a shrinkage of the area of round cell infiltration, I ordered hot wet dressings for the time being. But by March 5th the red area had increased quite considerably and the patient was beginning to show signs of toxic absorption.

On this day under nitrous oxide, I incised the abscess, by a crucial incision, going a short distance beyond the indurated area into the healthy tissue.

I remember that I took particular pains in this case not to draw the knife blade from the infected area out into the non-infected tissue beyond, but started the cuts always from the normal skin, and cut half way across the abscess, then cleansed the knife in alcohol, and completed the cut by starting from the normal skin on the opposite side, joining the first half of the incision at the center. The same was done for the cross cut. Next the four flaps were dissected well up and packed under with sterile vaseline gauze.

The following day the wound was dressed, no further extension of the process had taken place.

On the 7th I was called to the house at five A. M. The patient had a rise in temperature, and severe pain in the left chest, about at the mid-axillery line. I saw him again at noon, and found him sweating. I could not make out anything definite in the lungs. At six P. M., he was still feverish and sweating and a cough had started.

On the 8th the temperature was 102.4° at 10 A. M. There was a marked increase in redness and swelling around the wound and the redness extended around to the flexor surface of the forearm. Still no definite sign in the lungs. At 6 P. M. condition the same.

On the 9th I sent him to the hospital in an ambulance. The redness had extended up the inner aspect of the arm to near the axilla. At 3 P. M., under ether (I think gas would have been better) I incised the inner aspect of the arm down to the level of the elbow, and extended the old cuts at the carbuncular site. No pus was found, but instead a serous fluid. The wound was packed with vaseline gauze and a wet boric dressing was applied.

On the 10th the temperature reached 102° and the patient was expectorating bloody sputum. While there must have been some lung involvement, it was not definitely found.

On the 11th the arm condition was apparently holding its own, and the patient on the whole was doing fairly well. But a blood count showed W. B. C. 27,000, and polynulears 97 per cent. The sputum showed type 4 pneumococcus.

Dry pleurisy was discovered in the right chest, and the lungs showed scattered areas where fine rales were made out, but the lung involvement was not apparently of a serious nature.

In the evening a pleuritic pain started in the left chest again, relieved by mustard, while the breathing was a little labored and 32 to the minute. At no time from then on did the lungs show definite areas of consolidation and the patient complained of pain here and there and everywhere, with no special relationship to the findings. The respirations varied from 24 to 32, and cough and bloody sputum were present on and off.

On the 13th, two days later, the W. B. C. had dropped from 27,000 to 25,000 and the polynuclears from 97 to 85 per cent. But now the whole forearm was greatly swollen and getting very brawny and indurated. The surface was studded by many small elevated areas, in size from millet seeds to split peas, corresponding to the lacunae of the lymphatic vessels.

Under gas, parallel incisions were made on the forearm up the center and along the radial side. Only the same serous fluid exuded. The cut edges of the thickened skin showed great numbers of miliary abscesses, and in fact all the area of infected skin was teeming with these small abscesses. Pus from the areas showed pure culture of staphylococcus aureus and a vaccine was made. The skin could be dissected off the underlying structures very easily, and felt and looked like the skin of a salted ham. The hand was very edematous, and the fingers were extended and stiff. It was very evident that the skin and the skin alone, was the seat of a very severe process.

Until now his temperature averaged about 101°, and not especially of the septic type. The pulse averaged 90, although often of poor quality. For the next four days the patient was more or less restless and wakeful. He was given anodynes and supportive medicines and what food he could digest. Also his autogenous vaccine was given.

The dressings were changed twice daily. Vaseline gauze had been packed under the skin edges, but now dry dressings were resorted to.

By the 18th the brawny induration had extended above the elbow, 1/3 of the way up the arm. We now tried soaking the whole arm in one per cent. creolin solution, every three hours for half an hour at a time, and dry dressings applied between times.

By the 20th the infection had reached half way up the arm and it became of the bacon rind variety as on the forearm. Under gas more incisions were made above the elbow.

It was impossible to stand by and let the process extend on towards the body, without making incisions, yet anybody could see that while the small foci in the line of the cuts were opened, yet many thousand others, that lay in the skin between the cuts, were still unattacked, and to reach them one would have to slash the skin almost to ribbons, and yet not reach all of them.

After the last incision in the arm, the parts were covered by gauze soaked in Dakin's fluid, and wet these with every two hours. A secondary hemorrhage ensued a few hours later which stopped spontaneously, but necessitated the giving of a saline infusion to overcome shock.

At 3 P. M., the patient was seen by Dr. Ellsworth Eliot, who didn't think Dakin's solution was of much benefit for skin infections, but otherwise thought we were doing the best possible for the patient. At 4 P. M., a rectal drip was started, and continued at intervals during the rest of the day and night, and the following day.

At 8 P. M., the patient was seen by Dr. Goodrich of New York, by request of the family. He did not look at the arm but examined the chest, and thought he found some consolidation at both bases, but he couldn't decide whether the lung condition was a primary process, or secondary to the arm infection.

It was difficult for him, and had been for us for the past week, to examine the chest satisfactorily, as the patient could not be moved about much, the arm was now so large, heavy and sodden, and painful on manipulation.

The 22nd found us still using the Dakin solution, but by this time the brawny swelling had extended up to the axilla, and the arm was nearly twice its normal size. The patient was very restless and showed signs of severe toxic absorption.

On the 23rd stimulants were being pushed but the man was quite exhausted, though his mind was still clear. At 7 P. M., the patient was seen by Dr. Loevy, the celebrated French surgeon, from the War Demonstration Hospital of the Rockefeller Institute. He examined the arm carefully and suggested soaking the whole arm in a bath containing 10 per cent Dakin's fluid in sterile water, the arm to be kept in the soak three hours twice daily, and if that did not improve the condition, to apply a dressing wet with fifty per cent. alcohol in water. After the first Dakin's soak the patient felt chilly and exhausted, and later became a little delirious. We then used the 50 per cent alcohol treatment to the end.

From March 13th the temperature averaged only about 99.4° and the pulse 80 to 100, and the respiration 24 to 30. But from then on the curves have been greater, though the highest reached was only 101.2°.

The patient died March 28th, about thirty days from the onset of the carbuncle. The infection had reached the shoulder and was commencing to bridge across to the chest.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

New York, January, 1920

CHRONIC MEDULLARY BONE ABSCESS.

Among the many soldiers who suffered gunshot wounds of the long bones (compound fractures in most cases) it seems likely that we shall encounter, as a late sequel—a residuum—of the infection, several instances of a condition that is but little described in our text-books of surgery and surgical pathology, and indeed, is not even mentioned in most of them, viz., chronic abscess in the medullary cavity.

As we have elsewhere pointed out* some of these chronic medullary abscesses of the long-bones, whether they contain but a few drops of pus or several drams, tend to become sterile and to run an afebrile course. In such cases the sole symptom is severe radiating pain in the extremity which is apt to be treated for "rheumatism" or "neuritis"; and the sole sign is localized bone tenderness.

Roetgenograms sometimes show clearly the site of the abscess in the medulla Often, however, the pus collection cannot be seen roentgengraphically, the appearance being only that of the ostitis or osteoperiostitis of the earlier process of which the abscess is the result. Sometimes the medullary cavity is much encroached upon or, in some places obliterated by the centripetal bone growth, and the central abscess may lie between two such points of medullary obliteration.

These pus collections in the medullary cavity may result from osteomyelitis of hematogenous origin or produced by infection from without (e. g. gunshot wound). It would appear that occasionally they may also arise as a hematogenous process with little or no infection of the bone substance itself.

In cases of chronic sterile medullary abscess an extensive osteotomy for the pus evacuation is not only unnecessary but harmful. Simple trephinage with a small instrument—an operation that can be performed under nitrous oxid—quite suffices. The pain and tenderness disappear at once and, usually, healing takes place promptly. No other instrument and no drain should be introduced into the bone, lest a secondary infection be produced. A small gauze or rubber drain in the soft parts down to the bone is sufficient, and this only for a few days. If some dormant organisms should be aroused to further activity a secondary operation may become necessary but even then it will be no more, and probably less extensive than a primary osteotomy uncovering the entire extent of the pus collection.

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*Brickner: Chronic Medullary Abscess of the Long Bones, Annals of Surgery, April, 1917, p. 483.

Surgical Suggestions

The utmost gentleness in handling nerves is essential to good results in the surgery of those structures. Squeezing and pinching the nerve do fresh harm.

As J. Ramsay Hunt has pointed out, a paralysis of the ulnar nerve may develop *several years* after an elbow fracture, from inclusion in slow-forming scar tissue. After liberating the nerve it is wise to transplant it to a site where it will not be in danger of re-involvement by connective tissue or bone growth.

When operating upon the ulnar nerve in the elbow region be careful not to injure the muscular branches (to the flexor carpi ulnaris and flexor profundus digitorum) given off a little below the joint.

A bit of muscle (e. g. from the temporal) laid on the spot will promptly check bleeding from an abraded brain surface. A tear or small hole in one of the venous sinuses of the cranium can be definitively sealed by pressing upon it for a minute a piece of pericranium; it adheres like a postage stamp.

The application of heat and the administration of small doses of morphine are the two most important remedies in the treatment of shock.

Shave the skin before applying adhesive plaster, as on the chest; but do not shave the skin when applying adhesive plaster or glue for traction in the treatment of fractures.

Surgical Sociology

Ira S. Wile, M.D., Department Editor

DISPENSARY PROBLEMS.

At a recent meeting of the New York Academy of Medicine, there were presented certain facts regarding dispensaries which command attention.

It was pointed out that dispensaries no longer are to be regarded as simply places for the treatment of the destitute, but also as central stations at which may be secured special consultations and the advantages of group diagnosis. The principal difficulties in the administration of New York dispensaries, now costing approximately two million dollars a year, consist of a lack of uniform organization, undeveloped policies, and unsatisfactory executive work.

A plea was made for an improved administration from the time of registration to the discharge of the patient. This involves a higher standard of service on the part of registrars, a more up-to-date scientific equipment of dispensaries, and the adjustment of consultant service and hospital social service for purposes of diagnosis and therapeusis.

Standardized record cards are indicated as well as an improvement in the character of the service of clinic secretaries, whether paid or unpaid.

Numerous changes are demanded in order to secure a higher type of nursing personnel, and it is suggested that nursing in the dispensary constitute part of the training of pupil nurses In this connection it may be said that numerous benefits will accrue if dispensary service for physicians be considered an essential part of the preparation for promotion to positions upon the hospital staff

In a municipal plan of dispensary organization, it is essential that "districting" be tried in so far as may be possible, with a view to placing general clinics in positions of greater function. Numerous difficulties attach themselves to this scheme, but none the less it merits trial with a view to giving more valuable service to the community. It is obviously essential that public appreciation of the scope and function of dispensaries be secured, in order that adequate financial and moral support be secured to permit of better development of the dispensary system.

The growth of public interest in tuberculosis, obstetrics, venereal diseases, industrial handicaps, and infant mortality, has given rise to special expansions of efforts to control and limit the social penalties arising from these causes. Stress thus far has varied in different communities, some placing the emphasis upon the preventive work, and others dealing principally with curative measures. The most valuable service of the dispensary, however, is secured when the ideas of preventive medicine are in the foreground.

In a broad sense, the dispensary system potentially exists as a miniature Board of Health when disease prevention becomes its central thought. The expansions, therefor, of dispensaries are most valuable when they assume the character of preventive agencies, and through public health education raise the standards of health and vitality of the community they serve. This does not involve a decrease of interest in therapeutics, because obviously the relief of existent defects and handicaps serves also as a measure of preventing further deteriorations in the health of the clientele. The early recognition of incipient diseases and defects is attended with greater certainty of cure, and is productive of a higher vital return for the time, effort and money expended.

Dispensaries are now in a state of transition, accommodating themselves to the altering views of social practice along medical lines. The importance of social service departments is recognized and the necessity of linking up social service with dispensary practice is appreciated. The greatest advance in dispensary reorganization will depend, therefore, upon the further unification of social and medical practice and the direct attention to the problems of public health education in all directions. The problems of administration take their form from a realization of dispensary aims, and a recognition of the changing clientele now utilizing dispensary service.

The fact that the Committee on Public Health of the New York Academy of Medicine presents a report based upon an analysis of existing conditions, and emphasizes the value and need of a growth in policy and a revaluation of aims, is but a single indication of the general awakening to the tremendous possibilities of dispensary service in the movement toward an efficient public health system. From the standpoint of the general public, there is probably a greater advantage in a highly developed dispensary system than is to be found in mere extension of hospital practice.

Progress in Surgery

A Résumé of Recent Literature.

A Study of One Hundred Cases of Suspected Chronic Nasal Accessory Sinus Disease, with a Report of the X-ray Findings. Howard Charles Ballenger, Chicago. *Illinois Medical Journal,* December, 1919.

Ballenger has studied the relative importance of the *x*-ray in the diagnosis of sinus disease. Twenty-eight of the one hundred cases were negative from the *x*-ray standpoint, and of these all but one showed no clinical evidence of sinus disease.

Of the seventy-two cases in which the *x*-ray revealed a cloudly sinus or sinuses, thirty-six were confirmed by surgical means, twenty-one were confirmed by clinical means other than surgery, four were post-operative—that is, plates taken from two weeks to six months after the sinus operation without unusual post-operative symptoms—leaving nine cases in which the sinuses were cloudy, but which showed no clinical evidence of sinus disease. Of these nine cases the plates showed part or all of the ethmoids cloudy in four cases. At the time of examination no evidence of ethmoid disease could be found, although all gave a history of having had former attacks of acute rhinitis, with a watery or a muco-purulent discharge.

The author's summary from these one hundred cases is as follows:

1. The chief difficulties in deriving the full benefits of the roentgenogram properly taken and developed is (a) reading the plate, that is determining the presence or absence of abnormal shadows or outlines; (b) having properly interpretated the plates the correlation of these findings to the clinical data obtained.
2. The *x*-ray is a valuable supplement to clinical diagnosis and when so combined, error in diagnosis is reduced to a minimum.
3. Valuable surgical information can be gained as to the presence of absence, size, shape,. depth, etc., of the sinuses.
4. Thickenings of the mucous membrane of the sinuses due to former operations, infections, irritations, etc., will produce a cloudy appearance or an indistinct outline of the sinus in the plate.
5. As a guide to the post-operative progress the *x*-ray is of little assistance in the chronically diseased sinuses.
6. The *x*-ray is usually essential to determine the fact that the involvement is confined to certain sinuses, sinus or part of a sinus.

Suppuration and Gangrene of the Lung: A Study of One Hundred Cases. Harry Wessler, New York. *Journal of the American Medical Association,* December 27, 1919.

While abscess, gangrene and bronchiectasis are usually treated as rare clinical entities, they are becoming of more interest because of the increasing possibility of curing them by operative procedures. Wessler prefers to consider them together under the head of lung abscess or suppuration, and gives a tabulated etiologic classification of his 100 cases, showing the larger number to follow tonsillectomy or other operations, pneumonia or grip. There were six cases following aspiration, and two were tuberculous. Other causes were represented by single instances. They may thus be divided roughly into two groups: (1) those due to the aspiration of septic material into the bronchi, and (2) those due to the various primary lung infections, including frank pneumonias and the postgrippal cases. These two groups are not only distinct in their causation, but differ also in their symptomatology and pathology. This is evident, however, only in their early stages; and in order to recognize these differences, it is necessary to observe them from their inception. The immediate result of the lodgment of infection in the bronchus is to set up a localized bronchiectasis which later invades the lung tissue and then an abscess cavity develops. Suppurative lung conditions begin, whether postoperative or postpneumonic, as a sort of local bronchiectasis. Postoperative and aspiration abscesses are twice as frequent in the upper lobe as in the lower, while the reverse condition prevails with the postpneumonic cases. The physical signs are notoriously uncertain, but the symptoms are plain. In the aspiration cases, the onset occurs after two weeks of foul expectoration with persistent fever and usually slight hemoptysis. The distinction from tuberculosis should offer no difficulty, because of the absence of tubercle bacilli and the usual localization of the condition. Club fingers occur earlier than in tuberculosis and may be also a diagnostic aid. It should be emphasized that it is not necessary to demonstrate one or multiple cavities, and such occur only in a fair percentage of cases, and only the larger ones are usually discovered. The prognosis is best in the postoperative cases, but disappearance of symptoms should not be regarded as decisive. Symptoms disappear in many postoperative cases, but recur later. The prognosis of the post-pneumonic cases appears to be almost completely bad, but the patients may live for years unless complications occur, and some may enjoy considerable comfort. The medical treatment offers little hope: relief of the cough is an important matter. Acute lung abscess or gangrene of the lung is not usually an operative condition, but Wessler's studies of these cases show that in about one-third of the inspiration cases recovery takes place spontaneously in two months. Wessler has little faith in artificial pneumothorax in these cases. In two of the cases in his series in which it was performed, the trouble was aggravated and both patients died suddenly after the last insufflation. The importance of a bronchoscopic examination is emphasized, especially before operation. Except in cases of long standing, removal of a foreign body may effect a cure.

A Modified Operation for Scrotal Varicocele. Samuel R. Meaker, England. *The Lancet,* November 29, 1919.

Meaker believes that in operations for varicocele, the correction of testicular ptosis by support or some form of suspension is more essential than the resection of veins. The author's operation, a modification of the Del Valle operation, omits resection altogether. He makes a longitudinal incision into the external spermatic fascia and cremaster muscle, and closes the incision by eight sutures longitudinally introduced, so that when they are tied the muscle is puckered and the testicle raised to the level of the root of the penis.

The advantages of the operations are:

1. It can be as easily and quickly done as the commoner operations for varicocele.
2. It is based on a sound anatomical principle.
3. It gives adequate and permanent suspension to the testicle, which is essential to a radical cure of this condition.
4. There is little or none of that plastic inflammatory thickening at the point of operation, which so commonly occurs in cases done by the old method.
5. The mobility of the intestine is not restricted by the formation of adhesions at this point.
6. The operation is not followed by congestion of the testicle or any other form of circulatory disturbance.

Convalescence is rapid. The patient gets up in a week, and permanently discards his suspensory in a fortnight.

The Pathogenesis and Treatment of Lympho-Sarcoma and Hodgkin's Granuloma. Isaac Levin, New York. *Annals of Surgery,* November, 1919.

The author suggests that inflammatory lymphoma, Hodgkin's disease, and lympho-sarcoma may be different stages of the same disease, in spite of the fact that each presents a different pathological picture. Many cases show lesions of two or three of these conditions side by side. It seems most likely that Hodgkin's disease does not begin in a normal lymphoid system. Tubercle bacilli or some other infectious agent produces an inflammatory lymphoma, and subsequently an unknown etiological agent transforms the latter into a malignant lymphoma. When all the types of cells within the gland proliferate, the condition is one of Hodgkin's granuloma. When, possibly as a matter of simple accident, one type of cells dominates over the others, there develops a condition of lympho-sarcoma. Lympho-sarcoma is no more identical with a true sarcoma than the Hodgkin's granuloma itself.

Hodgkin's granuloma and lympho-sarcomata are more promptly influenced by radium and *x*-ray than any other tumor. The affected lymph glands diminish rapidly in size, and with it there is a marked improvement in the general condition of the patient. Besides the affected lymph-glands, the spleen should be subjected to the same treatment. It is possible, when radium and *x*-ray treatment of Hodgkin's or lympho-sarcoma is begun early and kept up for a sufficient length of time, that the glands may be replaced by dense connective tissue. The treatment of these conditions should be continued for months. The opinion prevails that the action of the *x*-ray is only palliative and that ultimately the patients fail to respond to treatment. These unsatisfactory results are probably due to the fact that radium and *x*-ray treatment are attempted only late in the disease and not pursued with sufficient energy.

Inoperative Cancer and Other Conditions in Which Radium Is Indicated.

William D. Haggard, Nashville. *The Journal of the Tennessee State Medical Association,* December, 1919.

Some of the more important conditions treated by Haggard were all types of malignant growths, fibroid tumors of the uterus, enlarged prostate, lymphatic leukemia, leucoplakia, nevi—capillary, cavernous, moles, warts, papillomata, tuberculosis of glands, skin and joints, keloids and vicious cicatrices, lupus erythematosus, psoriasis, pruritus.

The results of radium treatment of sarcoma are, generally speaking, more satisfactory than in any other form of malignancy. If treated in the early stages, the results are most gratifying. These tumors should be treated by insertion of tubes directly into the tumor substance and by external radiation as well. It has been found that the best and most satisfactory results are obtained in lympho-sarcoma, and the disappearance of these tumors is marvelous. Sarcoma of the tonsil and post-nasal space responds most satisfactorily also. Melanontic sarcoma has been found to be less amenable to treatment.

From the author's own observations, and those of Young, Janeway, Kelly and others, he presents the following conclusions:

"1. The therapeutic application of radium is in its infancy, but indications are that its growth will be of increasing therapeutic benefit in the treatment of tumors, new growths, benign or malignant, and in the progress of certain other diseased conditions, as lymphatic leukemia, etc.

"2. It has been proven of value in the treatment of certain superficial diseases of the skin and mucous membranes, lichen planus, lupus erythematosus, cicatrices, painful affections of the skin, moles, papillomata, warts, angioma, pigmented nevus, rodent ulcers, epitheliomata, etc.

"3. Many benign tumors situated favorably are very satisfactorily treated with radium, as certain fibroids of the uterus, and some cases of adenoma of the prostate.

"4. Inoperable malignant tumors and growths are greatly benefited by its application. Sarcoma, best; carcinoma of cervix, next; and lymph-adenoma, carcinoma of lip, tonsil, esophagus, antrum and prostrate are sometimes best treated by radium.

"5. Radium used intelligently in conjunction with modern surgery and medicine will aid much in lessening the suffering and in lengthening the lives of many of our fellow-men."

Report of a Case of Restoration of the Bile Passage.

Joseph D. Collins, Portsmouth, Va. *Virginia Medical Monthly,* December, 1919.

The following unique operation is of very great interest. The case was one of beliary fistula, following cholecystectomy in a woman; the obstruction in the common duct probably cicatricial in character. The essential feature of the operation was the dissection of the fistula in toto, and the use of the fistulous tract itself for anastomosis.

The operation in the author's words was as follows:

"The exposure of the common duct appeared hopeless. The tract of the fistula through the abdominal wall to the skin was completely dissected out. This fistulous tract became a well organized tube of connective tissue about one-quarter inch in diameter. A section of a No. 12 French soft rubber catheter was inserted into the open end of the fistulous tube for the distance of two inches. This was secured with one stitch of catgut. Four inches of the rubber tube projected beyond the end of the fistulous tube. At a point opposite the margin of the liver a stab wound was made into the duodenum. The fistulous tube with the rubber tube projecting from its distal end was turned into the lumen of the intestine and the stab wound closed with a purse string suture. The intestine was then drawn up and sewed after the manner of the Witzel operation. The anatomosis was further strengthened by sewing over it a tag of omentum.

"The abdominal wound was closed without drainage. Nothing was given by mouth for five days. On the third day a copious bilious stool was passed, the first for two months. Her recovery was quick and uneventful. The rubber tube was passed on the sixteenth day.

"Her digestion is normal and she is free from pain. She has gained thirty-five pounds in weight. She is apparently perfectly well. I realize that there is grave danger of cicatricial contraction in the fistulous opening into the intestine, with recurrence of obstruction. Just how long this fistulous tract, which is not lined with epithelium, will remain patent is problematical.

"A search through the literature disclosed only two cases where this method of repair was adopted, and both were unsuccessful."

Gangrenous Appendicitis Coincident with Labor.

James Francis Grattan, New York. *Surgery, Gynecology and Obstetrics,* November, 1919.

Grattan, reports the first case in medical literature, of a patient operated upon for acute gangrenous appendicitis during the active process of labor. The author appends a detailed history of the operation, post-operative course and delivery. The outstanding features of the case were as follows:

1. A young woman, vigorous, primipara, normal obstetrical outlook, no complaints.

2. The simultaneous occurrence of early labor pains, with abdominal symptoms, ending in the diagnosis and operation for appendicitis.

3. The removal of a totally gangrenous appendix, filled with pus, and about to perforate. A beginning peritonitis of sero-purulent character.

4. The subsequent delivery of a normally formed and developed full-term baby and placenta. A state of apnea in the baby, lasting 45 minutes, with good pulse, followed by a normal period of three hours. The recurrences of the apnea, with normal periods between, finally ending in failure of the baby's heart action and death, seven and a half hours after delivery. The apnea was probably toxic from the pus in the mother's appendix.

5. Almost fatal post-operative complications of the mother—cardiac and renal failure, almost of fatal termination and undoubtedly of toxic origin from the appendix, and a subsequent jaundice, an effect of the toxemia upon the liver function.

6. Complete recovery without residual pelvic exudate, without cardiac, renal, or other residue, of the complications, and without invalidism of any kind.

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THE ADMINISTRATION OF ANESTHETIC IN HOME MILITARY HOSPITALS.*

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From the beginning of August, 1915, to the end of July, 1916, I occupied the position of Consulting Anesthetist to the Malta Command, that is, during the period of the Gallipoli activities, when the greater part of the beds that the island contained were occupied by surgical cases. For the last fourteen months I have been in a similar position at home, and in that capacity I have visited all, or nearly all, the principal military surgical hospitals in England. In Malta, of course, all the *deaths under anesthetics* were notified to me, and since the middle of January of this year I have received detailed reports of all the fatalities in England, Scotland, and Ireland.

Most of you will recollect, I expect, that in the pre-war days I always deprecated the endeavor to use any one anesthetic, or any one method in every case, and insisted upon the advantages of varying one's procedure in accordance with certain elemental circumstances such as sex, age, physical condition, and nature of the operation. While my views upon this point remain unchanged, I appreciate the fact that the relative values of these resective factors have altered materially under the stress of war. Questions of age and sex have practically disappeared, and the main determining factors are those of the previous condition and the nature of the operation, and even these have very much altered.

DETERMINING FACTS.

First of all with regard to the factor of the previous condition, it seems to me that except for the secondary results of .his injury, the soldier may be described as an average healthy male. But these secondary results are of much importance, and introduce, factors which are comparatively speaking unknown in civilian practice. For instance, with the acute shock of the battle-field we have but little to do in the home hospitals, but, on the other hand, very many of the men are suffering from a condition of *chronic shock* which renders them rather troublesome from the anesthetist's point of view. Then again, many of the soldiers have been the subject of a somewhat prolonged suppuration of varying intensity. This may not perhaps produce all or any of the characteristic objective symptoms of acute sepsis, but I am sure that it has a very bad effect upon the heart muscle. It is rather more than a mere coincidence that of forty post-mortems at home the heart muscle was found more or less degenerate in twenty-six, and of these twenty-six there were definite records of prolongd sepsis in twenty. A somewhat similar degeneration, too, results from malarial poisoning, to which the troops are exposed upon some of the fronts. *In Malta the question of the effects of malaria upon the heart muscle and its relation to death under anesthetic was the subject of an exhaustive inquiry by the authorities in that island.*

We do not, nowadays, hear very much about the so-called *soldier's heart,* which was the subject of so much controversy about the time of the Crimean War and after. I am myself inclined to believe, however, that *the dilated heart of over-training and under-feeding is of fairly frequent occurrence, and when by a rare chance such a patient comes under the anesthetic, trouble is very likely to arise.*

As regards the nature of the operation, the differences entailed by war conditions are so obvious that one need do no more than enumerate them. Intracranial injuries are usually treated at the base hospitals abroad, and we see but few at home. At any rate, I know that while I was in Malta such operations were of almost daily occurrence, but I do not think that I have seen a single one since I have been doing home work. Injuries involving the pleuræ are relatively numerous, severe, and complicated. Abdominal surgery, except in point of view of numbers, does not seem to me to differ from similar cases in civil life. *There are, however, at least three classes of case in which the work of the anesthetist has been most distinctly altered and severely tried. I allude to spinal injuries, orthopedic surgery in general, and plastic operations upon the face.*

Looking at the whole subject from a broad general point of view, I should be inclined to say that in military surgery the exceptional cases call more insistently for variations in methods of anesthetization than in civil life. But, on the other hand, the number of normal or straight-forward cases is relatively larger. This means of course that our first consideration is the selection of an anesthetic and method which may be employed almost as a matter of routine.

SELECTION OF ANESTHETIC AND ROUTINE METHODS OF ADMINISTRATION.

In deciding this question there are two very important points which must not be lost sight of. The first is the personality of the anesthetist. The additional military and war hospitals scattered throughout the country are to be numbered by hundreds, and the difficulty of supplying them with skilled or even efficient anesthetists is very great. The patriotism and willingness with which medical men and women have come forward to staff these hospitals are quite above any praises of mine, but I am sure that none of them will mind my saying that the task of administering anesthetic has not always been one with which they have been most pleased or for which they have considered themselves the best fitted.

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* Read before the Royal Society of Medicine, Section of Anesthetics.

The second point is that the large number of military hospitals taken in conjunction with the frequent and necessary changes in the anesthetists who work them, renders it very desirable to standardize the equipment provided, and to render that equipment as simple as is compatible with efficiency. The standard at present is:

(1) Nitrous oxid apparatus.
(2) Schimmelbusch's frame.
(3) Clover's inhaler.
(4) Junker's bottle (Rigby's safety pattern is now issued).
(5) Tongue forceps.
(6) Mouth gag.

One or more of each is provided in accordance with the size of the hospital and the number of operating theatres in use. For special hospitals, and where special cases are treated by special anesthetists, special instruments are obtainable. To my mind the War Office is quite generous in this respect, but naturally the authorities do not wish to lend themselves to the exploitation of cranks and instrument makers.

On the whole, therefore, one is bound to select as a routine anesthetic a method which is the least liable to abuse, and in the use of which the anesthetist, even if rather below the average, is least likely to go wrong. Amid conflicting opinions the task is not so easy as it seems. There is one negative point, however, upon which I hope my opinion may be largely supported—*i. e.*, that in military surgery at home the routine use of pure, unadulterated, or as our American colleagues call it, *straight chloroform*, as a first choice is to be avoided as much as possible. Briefly stated, my chief reasons are the following:

(1) In the hands of the most skilled the mortality is relatively high. I believe that it is something approaching 1 in 2,000. In military work I do not know exactly what the proportion may be, but I will give you some figure: *Of the deaths under anesthetics which have been reported to me since January,* 1917, *at least* 55 *per cent., and probably more, were due to or occurred under chloroform used in an undiluted form, and in many other cases the chloroform was by far the predominating drug. One may admit, of course, that in many of these cases the use of chloroform was almost imperative, and that in many the condition of the patient was such, that in all probability he would have died under any other anesthetic, but such admissions do not really affect the figures. I would further point out that of that* 55 *per cent., in fully* 28 *per cent. death occurred before any operation had commenced.*

(2) In the course of my wanderings, I have been much struck by the fact that of the most earnest advocates of pure chloroform, only a comparatively small number really know how to give the drug properly. As an example of this, let me instance the gentleman whom I found pouring drachm doses of chloroform upon a lint-covered Schimmelbusch's mask, over which, and his retaining hand, he had thrown another sheet of lint about the size of a pocket handkerchief. From the same hospital I received complaint of the impurity of the chloroform which, I was told gave rise to a great deal of lividity.

Although I object to the use of undiluted chloroform as a first choice, for routine work, it must not be supposed that my condemnation extends further than this. I fully recognize the value of this drug for many cases, and I would even say that when sufficiently diluted down with ether in the shape of one or other of the mixtures, and administered carefully by the open method it forms a very simple and admirable method of inducing anesthesia previous to the continuous use of ether.

For quite short cases some form of local anesthetic is, I believe, often employed, but these naturally do not come under my ken, and I have no means of knowing exactly to what extent this method is really employed. I am inclined to think, however, that it is not employed nearly to the extent that its most earnest advocates could wish, and for this I have no doubt that the surgeons could give sufficient reason.

For similar short cases an alternative is nitrous oxid. This is not used nearly so often as I should like to see it used. Two difficulties arise with regard to it. First of all the supply is somewhat scanty and irregular, and in the second place the average anesthetist in the military hospitals rather fights shy of it.

OPEN ETHERIZATION.

Failing local drugs and nitrous oxid, the anesthetic of my choice for continuous work is ether, and with certain reservations and precautions I prefer the open method. The details of the particular method that I advocate do not, I expect, differ very materially from those employed by most of you, but in order to make myself quite clear, I will briefly refer to the points upon which I like to insist:

(1) A preliminary injection of morphin ¼ gr. and atrophin 1/100 gr. For military work I think that this should be given rather less than half an hour before the operation. In my opinion the orthodox one hour is too long. See, too, that the *patient* gets the full dose, not the bedclothes.

(2) A small pad of Gamgee tissue with a hole in it round the nose and mouth.

(3) A Schimmelbusch's mask covered with from twelve to twenty layers of gauze. This may be clipped to the pad by means of tongue forceps, and a useful hinge is thus formed.

(4) Although when time is no object and the surgeon is good natured, one can start with ether from the very beginning, I think that it is better in most cases partly to induce with a mixture, or even with a Clover's inhaler. In many cases I employ chlorid of ethyl on the open mask in the manner suggested by Dr. Barton.

(5) As a drop-bottle I recommend the metal flask devised by my friend, Dr. McCardie, of Birmingham. This enables one partially to regulate the flow of ether, and is therefore economical; it also possesses the great advantage of being practically unbreakable.

(6) The late Sir Frederic Hewitt introduced a very useful open airway tube passed into the mouth over the base of the tongue. I prefer to pass a smaller and softer tube about 5 in. down the nose, a device which I have found most useful, and now employ in almost every case.

This is the plan that I have advocated at most of the military hospitals which I have visited, and I believe that it is very widely adopted. The equipment of all military and war hospitals includes one or more Clover's inhalers, and at some of the hospitals I have visited I find that the anesthetist is rather wedded to that instrument and will not succumb to my blandishments in favor of the open method. Under these circumstances I generally suggest to him to try the plan proposed by Dr. McCardie of putting 1 dr. of chloroform into each 2 oz. charge of ether. I have myself had much success with this method, and believe it to be capable of extension in various directions, for instance, I am inclined to think that the same degree of dilution might be used by the open method all through, and would to some extent meet the objection so often raised as to the large quantity of ether required in long cases. In this connection I may perhaps say that from a large number of figures I have obtained I estimate that the quantity of ether required for open administration works out at 6 to 8 oz. per hour (in Malta it was to 8 to 10 oz.). Whichever plan has been adopted, I am very certain that less pure chloroform and more ether is being given in the home hospitals now than was the case twelve months ago. I think, too, that I can point to some definitely good results which have followed the change, for the death-rate for the quarter ending September 30 has been rather less than one-half of the average rate for the two quarters preceding.

ANESTHESIA FOR SPECIAL CASES.

I now come to the question of the anesthetic to be used in the various special cases to which I have alluded. *In the cases of modified or chronic shock to which I have referred I doubt whether one can give too much morphia, but in cases of sepsis, malaria and other heart trouble, I would avoid the use of morphia.* In other respects I would base my anesthetic treatment of all these cases upon three fundamental lines, viz.:

(1) Avoid all but the most dilute doses of chloroform.

(2) Give as little anesthetic of any sort as possible.

(3) Avoid anything like asphyxia, by diluting the vapor very freely. For which purpose oxygen given either by itself or bubbled through your anesthetizing agent is very useful.

It is in such cases as these that the use of the continuous gas and oxygen methods of the American surgeons seems likely to be of considerable value. Others who are here to-night will probably speak to you more in detail as to the particular advantages of this method. All I will say at present about it is that the present forms of apparatus seem to me to militate considerably against its general employment, nor am I quite convinced as to the quality of the anesthesia produced.

In discussing the question of a routine anesthetic I purposely avoided any allusion to the warm ether method, mainly because Dr. Shipway will probably speak upon that method, but partly because it does not appear to be used to any great extent at home, partly, also, because the method seems to me to lack that element of simplicity which I believe to be so essential when dealing with a large number of administrators of varying skill and capacity. I think, however, that in the class of cases with which I am now dealing—*i. e.*, chronic shock and sepsis, warm ether would very likely be of considerable advantage. *In intracranial cases, morphin* *is usually unnecessary, as the patient is often in a semi-comatose or dazed condition. For the same reason, too, very little anesthetic is required. In these cases I prefer chloroform because it is desirable to limit the venous congestion as much as possible. I usually administer it by means of a Junker's bottle, through which I pass a very small stream of oxygen, leading the mixture of chloroform vapor and oxygen down the nose by means of a soft tube.*

The mortality arising from operations of the empyema type is rather heavy. Most of the cases dealt with in the home hospitals are of course of the chronic type, and have been the subject of prolonged and severe suppuration. They are, therefore, particularly bad subjects for anesthetics of any sort. There is no doubt that these cases ought all to have some form of artificial respiration as is typified in the intratracheal method. Unfortunately, however, my experience is that neither the anesthetist nor the surgeon seem always to grasp the seriousness of the problem which is before them when they decide to operate. The intratracheal apparatus is so cumbersome, costly, and difficult to manipulate that but very few establishments are equipped with it. Not only so, but the anesthetists are constantly changing, so that even when one man has learned to use it the probabilities are that he gives place to another in the course of a few weeks who does not know how to use the machine. I can only think that these cases ought to be concentrated in a few of the better equipped hospitals where this method is available. Failing this, chloroform and oxygen should be given very gently from a Junker throughout the operation.

In cases of spinal injury the position is often complicated by the fact that the patient is turned wholly or partly upon his face; this not only entails compression of the chest but obliges one to pump the anesthetic into him. Then again, avoidance of venous congestion is desirable. Taking all these points into consideration I am inclined to give these patients oxygen and mixture from a Junker's bottle. But these are cases in which the care and vigilance of the anesthetist are more important than the actual method employed.

One would imagine that orthopedic surgery was the special field for the use of the intraspinal methods, but I am surprised to find that, as far as my experience goes, this is not the case; nor is any explanation forthcoming. Nitrous oxid is frequently used, and it requires a good deal of skill in the manipulation of the administration to hit off the precise moment at which the fullest possible degree of relaxation is obtainable. The average orthopedic case does well enough with ether, but it must be ether given without a trace of asphyxia so that there is as little congestion of the veins as possible. At one of the orthopedic hospitals visited I received complaints about the amount of venous congestion, which in this instance was attributed to the use of warm ether, and unless the warmth of the ether vapor is very carefully regulated it does seem to produce considerable venous congestion.

ANESTHETIC FOR PLASTIC FACE SURGERY.

The question of the anesthetic in plastic face surgery and allied conditions deserves a whole evening to itself. It is one in which I have taken a great deal of personal interest, and one of the most difficult questions with which we have to deal. *The chief troubles arise partly from the presence of large quantities of blood in the mouth and pharynx, partly from the necessity of getting out of the way of the operator, and partly also from the difficulty in manipulating the anesthetic when the jaw is wholly or partly fixed, or even perhaps unduly mobile. There is no operation in which the anesthetist can be of so much real assistance to the surgeon, or where the value of a good anesthetic is so conspicuous.* For this reason I do not favor the view sometimes taken that one particular method should alone be employed. Not only do the cases vary very much in themselves, but one should take into account the capabilities of the anesthetist. In some few instances the ordinary routine methods are possible, but these are rather in the minority. In most cases exceptional methods will have to be employed. Of these exceptional methods I recognize four varieties.

(1) *The intratracheal method.* I place this first on the list, for just now it is very much in fashion. I acknowledge that in some cases it is almost indispensable, but I do *not* admit that it is necessary or even advisable in all or even in the majority of cases. Time, however, will not permit me to give my reasons for this opinion.

(2) Allied to this plan is what I would call *the intubation method,* by the means of a Kühn's tube. This method is little known in this country and I believe that it has many advantages, for the whole of the pharynx can be fully packed and the blood and mucus are then absorbed.

(3) Another plan which I also think is not as much practiced as it should be, is the *colonic ether-oil method* of Gwathmey. I have used it myself many times and seen it used by others, and always with satisfaction and advantage. It is probably

the simpliest known method of giving an anesthetic.

(4) The fourth plan—*the method of position*—is one I naturally esteem highly, as I am mainly responsible for its use in this type of case; but for that very reason I am not disposed to say much about it now. Anesthesia is induced with the patient sitting bolt upright on the table, any routine plan being adopted. The anesthesia is maintained by means of a nose-tube conveying oxygen and chloroform vapor; or the vapor of mixture or ether may be used. This plan has been sharply criticized, but at least I can say of it that it has been in use now for over a year at one of the principal "facial" hospitals in the kingdom, and that no fatalities have attended its use.

Whichever plan be employed, it may be supplemented by the use of some form of suction apparatus on the principle of similar tubes used by dental surgeons and with the same object—viz., the removal of blood and mucus from the buccal cavity.

ETHER BRONCHITIS RECORDS.

Before concluding what I have to say on the methods of anesthetization there are, however, two minor points to which I should like to draw your attention. The first of these is the occurrence of the so-called *ether bronchitis*. In the pre-war days one was very much inclined to put this down offhand to simple exposure, either in draughty passages or in the wards themselves. In my visits to hospitals of very varied type throughout the country, however, I have come across cases of bronchitis under such different conditions and surroundings that I am not at all sure that the theory of *exposure* will hold good. In some places it almost appears to be epidemic: in others it partakes of the nature of an epidemic; while in other places again where it ought to be rampant it hardly ever occurs. The second point is the question of records. In the original army scheme the only provision made for recording the work of the anesthetist was in the shape of one, or at most two rather narrow columns in the *operation book*. In Malta I drew up a form for this purpose, and from it I obtained some valuable information, the hospitals being all within reach and the operations not over numerous. A somewhat similar form is now in use too, in most of the English Commands. But I am not satisfied with the results; the figures do not appear so reliable. But at any rate I think that they have served one useful purpose—viz., that of increasing the interest of the men in their anesthetic work, something that is very desirable.

TRAUMATIC SHOCK AND ITS TREATMENT.*

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INTRODUCTION: Most surgeons are called upon at one time or another to treat cases of traumatic shock. As a rule, they are accidental cases occurring in the factory, street or railroad crossing. One finds all stages of shock in such cases and not infrequently, the surgeon has to act quickly to save the life of the patient.

As one would expect, traumatic shock was a frequent occurrence on the battlefield and although, both American and foreign workers have given considerable study to this problem, the results obtained were nevertheless of little value from a practical viewpoint. This, as will be shown in the text, was largely due to the fact that most of these investigators adhered to the theory of the nervous origin of shock, instead of the theory of the toxic origin of shock, long advocated by the author.

We also frequently witness manifestations of shock on the operating table, shown by patients during anesthesia. This is particularly true in operations of the stomach as well as general abdominal surgery. It is evident, therefore, that it is of the utmost importance to the surgeon to have a precise knowledge of the phenomenon of shock.

The anesthetist also needs to fully understand the nature of shock. In the first place, shock may be produced by anesthetics such as chloroform and ether. Secondly, shock may be developed after recovery from anesthesia. Finally, traumatic shock is regarded as a contra-indication for anesthesia. It is thus evident to what extent it is important not only for the surgeon but for the anesthetist as well, to fully understand the nature, etiology and pathology of shock and also the rational method for preventing and combating shock.

REVIEW OF LITERATURE.

There still exists much difference of opinion with regards to the nature of shock. Goltz, who, it will be recalled, produced shock by tapping the surface of the body of animals, regarded it as a vaso-motor reflex phenomenon. In our country after the Civil War three military surgeons, Weir Mitchell, Moorehouse and Keene, supported the Goltz theory of the nerve origin of shock. More recently physiologists working along this field, have also supported this view. Crile and Meltzer, while making a slight difference in their explanations, are practically committed to the nerve origin of shock. Cannon (Jour. A. M. A., Vol. 70, P. 617, 1918) states that "Primary wound shock may come on so soon after injury as to be accounted for only as a result of nervous action, and as pointed out in the earlier paper. the individual with acidosis (is) sensitized so that operation, because still further increasing the acidosis and still further lowering the blood pressure, becomes hazardous. It leaves unsettled .... the occasion for the primary fall of pressure though the suggestion is offered that it may be of reflex character."

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*Read during the Seventh Annual Meeting of the American Association of Anesthetists, at Atlantic City, June 9-10, 1919.

The nerve origin of shock has been accepted practically in toto by the Allied Medical Research Committee in England and The National Research Committee of the different universities of this country. The mode of treatment they recommend in wound injury and trauma, consisted largely of antiseptics and drainage. But the failure of this treatment is now generally conceded. Crowell finds no evidence of any permanent benefit following the injection of drugs in such cases. Armstrong expresses his belief that the value of antiseptics and drainage in trauma is entirely overestimated and Bainbridge reports in the U. S. Naval Bulletin (1918) that the use of antiseptics was definitely abandoned in favor of operative surgery.

THE WRITER'S THEORY OF SHOCK.

Some years ago while investigating cell necrosis I was led to the view that traumatic shock was caused by poisons or toxins liberated from the wound itself and my experimental and clinical studies in this field since that time, have furnished abundant evidence of the correctness of this view.

Briefly stated, in trauma we have destruction of tissue. This tissue is immediately attacked by enzymes, which cause it to undergo autolysis. During this autolysis split proteins are set free which are extremely toxic and when liberated in large enough quantities, cause traumatic shock. It is evident from this view that one of the primary considerations in the treatment of traumatic shock ought to be the removal of the devitilized tissue from the wound and thus prevent the poisonous split proteins from spreading destruction to normal tissue. This explains why surgery in traumatic shock is more successful than antiseptics and drainage. In the latter you have a slow process of killing the bacteria and removing the pus. If the antiseptic is too strong it only helps to bring about further cell necrosis. In surgery, however, the removal of the larger quantity of necrosed cells is brought about which minimizes the production of toxic split proteins.

Brachet brings out this point very forcibly adding "that while interventionists may sometimes have to regret the hypothetical preservation of a limb or one of its segments, conservatives often have to regret the loss of life." This is precisely what Du Bouys, one of the surgeons of the Revolutionary War, states, saying that "American Surgeons amputated at once and lost but few, but the French delayed and lost many." Larry, who was the first Naval Surgeon who cruised in American Waters (1787) and who afterwards became Surgeon in Chief of the first Napoleonic Army says, "I have lost a great number of soldiers, because although operated upon within the first twenty-four hours, yet the operation has been performed too late. It is then demonstrated that the "commotion" (shock) far from being a contra-indication to primitive amputation, ought to decide the surgeon in its favor. The effects of "commotion" (shock) far from being aggravated, diminishes and disappears after the operation."

Going back to the nature of shock, any agent capable of destroying tissue, may be an etiological factor of shock. Chloroform and ether cause cell necrosis and, therefore, produce shock or increase it when already present. My investigations amply explain why debridement not only removes the devitalized tissue from the wound, but prevents the poison of dead tissue from spreading cell destruction to the normal tissue. Primary suture restores the circulation of the injured part and puts a stop to further cell necrosis. This operative procedure promptly reduces the amount of cellular poison that is generated following the injury of tissue cells occurring in every wound. Crile (Canadian Med. Assn. Journal, Nov., 1918) mentions the biological importance of the effect of debridement and primary suture. He states "When the wound was surgically completed it contained many bacteria, but the obstacles to its biological defense had been removed. Then followed in natural sequence the usual "asceptic fever" and rise in blood pressure which is a good sign in recovery from shock." This clearly indicates that the presence of bacteria in a wound does not necessarily interfere with recovery from shock. Crandon and Ehrenfield are in entire agreement with my views, stating, "This reaction from shock is due to the absorption of decomposed products set free by disintegration of tissue." When these decomposed products of tissue disintegration become excessive and allowed to continue, death rapidly follows.

Although I consider surgery far superior than antiseptics in the treatment of traumatic shock. I am not advocating the employment of surgery in all cases. Indeed, most of the cases of traumatic shock which I had occasion to treat, were restored without recourse to surgery. My treatment is both physical and biological rather than surgical, as is explained later. Before, however, taking up the subject of treatment, it will be well to discuss my experimental data on the nature of shock.

EXPERIMENTAL.

The traumatic shock syndrome follows whenever destruction of tissue takes place. In the laboratory shock may be produced by simple ligature, cutting off the blood supply of a part. The interruption of the circulation prevents the tissues below the ligature from being nourished. Cell necrosis promptly follows. The changes taking place in the cell and tissue under these conditions have been well described by Virchow. It is in this cellular disintegration with the formation of modified albumin in the tissue (Virchow) that we are most concerned in traumatic shock.

The following is a typical experiment which shows the relation between cellular disintegration products and traumatic shock. A ligature (Esmarch) was placed around the thigh of a dog and immediately a small portion of tissue was cut off from a point below the ligature. This tissue was at once frozen, cut and stained. On examination, cytoplasm and nuclei were found to be normal. A small portion of this fresh tissue was then rubbed up with salt solution and injected subcutaneously in the animal. No injurious effects were observed. The injured limb was allowed to remain for three hours quiescent with a view of bringing about cell necrosis with alterations in the tissue albumins. Again a frozen section was obtained from a point below the ligature. On examination of cytoplasm and nuclei, it was evident that necrotic changes have taken place. The stain was indistinct and vacuoles were present. An emulsion in saline was then prepared from this disintegrated tissue and small quantity of this emulsion injected subcutaneously into another dog. The syndrome of shock followed with fall in blood pressure, fall in temperature and death. Autopsy was immediately performed and the *most marked feature observed in this animal was splanchnic stasis.*

THE RELATION OF TISSUE DISINTEGRATION TO TRAUMATIC SHOCK:

Animal	Character of Site of injury	Release of Ligature Hours after injury	Appearance of Shock Sym. Hours after release of ligature	Death Hours after Release of ligature	Time of Exam. After Sym. of Shock.
1. Cat	Mangled upper part of thigh.	2	2½	5	
2. Cat	Crushed lower part of thigh.	2	2¼	6	
3. Cat	Subcutaneous, clamp-thigh	1½	3	8	
4. Dog	Both thighs; constriction over ileac vessels	2	2½	7	
5. Cat	Crushing thigh	1	2		6 hrs.
6. Dog	Mangled upper thigh	2	3		7 hrs.
7. Dog	Crushing thigh clamps	1	2	9	
8. Rabbit	Mangled thigh	2	2½	6	
9. Rabbit	Extensive wound upper and lower thigh	1½	2	7	
10. Rabbit	Mangled thigh	2	2½	24	
11. Cat	Crushed thigh	1½	2	36	
12. Cat	Mangled thigh	2	2½		5 hrs.
13. Rabbit	Mangled thigh	2	3	24	
14. Rabbit	Crushed thigh	1	2		4 hrs.

Furthermore, section of the liver, lung and upper alimentary tract showed that the blood had stopped in the pulmonary zone of lung, portal zone of liver and submucosa of upper alimentary tract. In other words, it was a complete blood stasis in the splanchnic area which is the true primary pathogenesis of shock as described by the writer in 1897.

Finally, after removing the ligature, the animal's leg was gently massaged with this view in mind, that the disintegrated or modified albumins of the necrosed tissue of the leg, be carried into the general circulation. Immediately there was a drop in temperature and blood pressure with shallow respiration; in fact all the syndromes of traumatic shock, the animal dying within a short while after this procedure.

This typical experiment clearly indicates that the shock syndrome embraces two distinct phases; first, the toxins liberated by the disintegration of dead cells; and secondly, the marked splanchnic stasis.

The fourteen experiments tabulated in the following protocol were carried out in a manner similar to the experiment reported above. After constricting the animal's leg with an elastic ligature, the injury was produced either by incision, mangling or clamps. Varying intervals were then permitted for cell necrosis to take place. The absorption symptoms usually appear soon after the release of the ligature, if cell necrosis is well established. In all animals after shock syndrome was established; sections of the viscera were secured and immediately frozen, fixed and stained. The specimens were obtained in some cases before the death of the animal and in other cases after death.

The pathological findings in traumatic shock vary in degree but the primary change is the stasis observed in the splanchnic area, in the upper alimentary tract including the liver and lungs. This stasis is particularly noted in the portal zone of the liver; in the mucosa and submucosa of the upper alimentary tract and pulmonary arterial zone of the lungs. It is this congestion in the splanchnic area which is repsonsible for the fall in blood pressure and temperature and for the acidosis and metabolic failure. Examination of brain and nerve tissue immediately before or after death showed no changes which indicates that nervous manifestations play either a very small part or no part in the phenomenon of shock. "La Stupor" of Perigoff or "Topor" and "commotion" of Larry are secondary phenomena following the wake of the primary blood stasis.

It is perhaps well in this connection to point out that Raymonde, in 1909, tied off the circulation of the hind legs of a rabbit causing autolysis of the tissues. On reestablishing the circulation, there immediately followed dyspnea, rapid pulse, drop in temperature and other shock symptoms. Why shock followed in this experiment is evident from my above explanation. By interrupting the circulation, Raymonde caused autolysis of the tissue below the ligature and as the poisonous autolyzed products entered into the circulation, after releasing the ligature, the shock syndrome followed.

Treatment.

The above investigations clearly indicate that two factors underly the production of shock. The first factor is the blood stasis in the splanchnic area. It must be remembered that we are not dealing with mere congestion but with a state actually approaching coagulation. In other words, the circulation of the blood not only comes to a standstill in the splanchnic area, but that the viscosity of this fluid becomes so high, that on cutting a blood vessel in this area the blood will not run out, but will remain in the vessel.

The second factor is the production of toxins resulting from tissue disintegration. These toxins are produced by the action of ferments on the necrosed cells; shock being produced when these toxins enter the circulation.

It is evident, therefore, that the treatment in traumatic shock, in order to be successful, must aim (1) to remove the blood stasis of the splanchnic area and (2) to neutralize the toxins which are poisoning the patient.

This is precisely the principle of the author's treatment. To remove the blood stasis in the splanchnic area, heat is employed. This is based on one of the principles of colloidal reactions. To illustrate: If gelatin is coagulated in a test tube, we can bring about a reversal of the colloidal reaction, *i.e.* we can cause the gelatin to become liquid again, by the simple application of heat. In the same way, by applying heat to the partly coagulated blood in the splanchnic area, we help to cause the blood to become fluid again.

In cases of shock, heat to be effective must be applied as nearly in direct contact with the splanchnic area as possible. The application of hot water bottles to the surface of the body is too remote to be of value, even though they are applied to the abdominal wall. I have long advocated the use of small thin rubber hot water sacs introduced into the abdomen during surgical operations. The rubber surface is preferable to the injurious gauze, as it causes less trauma to the peritoneum and provides a more constant heat, which to be effective must be of high temperature as well as directly applied.

Where the abdomen is not opened the next approach to the splanchnic area is through the stomach. The small rubber sac described is attached to a double recurrent rubber tube and introduced into the stomach. The heat is maintained continuously by a constant infow and outflow as I described in 1896. The heat not only reaches the liver by the gastric veins but the thoracic area through the esophagus is more or less directly affected, thus preventing stagnation in the lung capillaries. These methods can be used throughout surgical operations and have been found to lessen the danger from anesthesia.

The colon is the next valuable avenue for heat application for the splanchnic area. Hot water introduced into the colon during surgical operations is not always practicable, but the small hot water bags introduced into the colon can be beneficially used, though heat applied here is not always as effective as by the more direct route, the esophagus and stomach. I have for many years advocated the use of the continuous irrigation of the colon (with the double recurrent tube, giving water of high temperature followed by cold; then repeated) in operative or accident cases and infections of various types. As a control to regulate the amount of water the outlet tube is connected with a vacuum bottle at the bedside which does not allow the colon to be overfilled.

The heat and absorption of the water have been shown to be of great value in all cases of shock and infection. The idea of the absorption of water alone without the heat led to the adoption of this method as the "Murphy drip." The danger of the injection of water by the colon, subcutaneously, or intravenously, was shown early in this work, and hence caution must be maintained by the proper dosage of the fluid intake. The value of this continuous fluid absorption and persistent heat within the abdominal area with the hot water bag will be more appreciated now that we know through our researches in colloidal chemistry that heat dissociates an absorption compound which occurs in the "colloidal complexes" in the animal organism in shock and infection. The application of heat to the soles of the feet has the advantage of being more direct in affecting the splanchnic area than when applied to the trunk, for the blood in the plantar veins when heated is carried directly by anastomosis through the hemorrhoidal vein into the splanchnic area, and portal vein of the liver.

Having outlined my procedure for overcoming the splanchnic stasis, our next problem is to neutralize the toxins which result from cell necrosis. This is brought about by the employment of a specific immune horse serum. The serum is produced by immunizing horses with properly prepared human autolyzed tissue protein. My procedure is described in detail in another place.* Suffice it to say in this connection, that if autolyzed human tissue is injected into horses from time to time, for a period of about six months, the animals develop in their blood specific antibodies against human products of tissue autolysis. Such immune serum, when subcutaneously injected in patients suffering from traumatic shock, has given, in the hands of the author, remarkably favorable results.

It will be recalled that the underlying difficulty in cell necrosis, is the fact that iso-autolyzed tissue resulting from the necrosed cells, enter the circulation and poison the patient. A serum therefore, which contains antibodies against human autolyzed tissue is, in the opinion of the author, the only logical treatment against the poisonous autolyzed tissue resulting from cell necrosis.

SUMMARY.

Traumatic Shock, according to the author, is the result of two underlying factors. (1) Marked stasis in the splanchnic area. (2) Toxemia resulting from autolization products of Cell Necrosis.

The method of treatment is primarily directed against the above two factors. (1) The splanchnic stasis is overcome by heat, in accordance with a well established principle of colloidal reactions. (2) The poisoning caused by products of cell necrosis is overcome by means of an immune serum which contains antibodies against human autolyzed tissue.

14 EAST 53rd STR.

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THE AMERICAN ASSOCIATION OF ANESTHETISTS WILL MEET IN NEW ORLEANS, APRIL 26-27, 1920, THE FIRST TWO DAYS OF A. M. A. WEEK. THIS—THE EIGHTH ANNUAL MEETING—WILL BE THE FIRST ANESTHETIC RALLY EVER HELD IN THE SOUTH AND IT IS HOPED THAT SOUTHERN ANESTHETISTS WILL PROMOTE THE INTERESTS OF THEIR SPECIALTY BY CO-OPERATING IN MAKING THIS MEETING A SUCCESS.

THE FOLLOWING WELL-KNOWN AUTHORITIES HAVE ALREADY CONSENTED TO PRESENT PAPERS—DRS. ALBERT H. MILLER, JAMES T. GWATHMEY, E. M. PRINCE, ANDRE CROTTI, CARROLL W. ALLEN, WALTER LATHROP, ANSEL CAINE, GEORGE PINESS, JOHN J. BUETTNER, E. I. McKESSON.

FOR FURTHER INFORMATION, APPLICATIONS FOR MEMBERSHIP AND PLACES ON THE PROGRAM, ADDRESS F. H. McMECHAN, M. D., SEC'Y, AVON LAKE, OHIO.

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* Medical Record March 2d, 1919.

EXPERIMENTAL SURGICAL SHOCK.*

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It is my purpose to review briefly in this article the results of the investigations of experimental surgical shock with special reference to those phrases that have a bearing on its relation to anesthesia. While the review is not complete, it will include what is now considered the most important conclusion with regard to the condition.

Very few subjects have received such renewed impetus for investigation as has surgical shock. When I first became interested in shock in 1912 there were not fifty articles dealing with any phase of the subject in a comprehensive manner. In the last few years the number has more than quadrupled, and in the enormous amount of work that has been done a few new facts of great importance have been discovered. Much of the recent experimental work, however, has been a reduplication of the work of earlier investigators. There are still many unsolved problems in connection with the condition which the surgeon diagnoses shock.

In order intelligently to evaluate the results of experimental investigation of surgical shock, two points, which I have repeatedly emphasized, should be noted. (1) The condition termed shock by the surgeon is undoubtedly due to a large number of causes, and (2) experimentally it is very difficult to reproduce the environment and all the phenomena which the surgeon calls shock. [8] [9] [10] [11] and [12]. While the clinical picture and the resulting condition may be quite similar, the causative factors are undoubtedly different in many of the cases diagnosed as shock. The experimental production of a condition which fulfills the clinical diagnosis of shock is very limited and it must be conceded that experimental investigation has duplicated but few of the conditions of shock which the surgeon sees. In general, most of the experimental work has concerned the methods of production and treatment of low blood pressure.

The Anesthetist and Shock.

The anesthetist is interested in surgical shock because, (1) a patient may develop the condition during or following operation, and (2) it may be necessary to give an anesthetic to a patient already in shock. The experimental investigator has been able to learn more of these problems in which the anesthetist is interested than of many of the other conditions which the surgeon terms shock.

The possible causes of a patient's developing the clinical sign of shock during or immediately following an operation may be included in four groups: (1) preoperative condition, (2) anesthetic, (3) trauma and exposure incident to the operation, and (4) hemorrhage. Other factors are involved but most of them fall within one of these divisions.

It is well known that the preoperative condition determines, largely, the manner in which a patient will react to procedures incident to an operation. There are some experimental data concerning this. For instance the clinical observations have been parallelled to a certain extent by the finding that dogs with distemper will develop the signs of shock after exposure of the abdominal viscera sooner than normal animals, [5] [14]. A fat patient usually withstands operation poorly, and it seems to be true after abdominal traumatization that a very fat dog will develop the sign of shock more readily than a normal one. The poor reaction of the patient who has been purged intensively may seemingly be reproduced experimentally in animals.

The effects of the anesthetic and its relation to shock are complicated [10] [13]. In general their relationship depends on the direct action of the anesthetic and the indirect results of its action. Both of these depend on many other factors, such as the kind of anesthetic, the method of administration, the amount of the anesthetic, and the depth of anesthesia. Low ether tensions, just sufficient to produce narcosis, will not lower the blood pressure in a normal animal even after many hours, and they do not, as nearly as could be determined, predispose the animal to shock. The signs of shock can readily be produced by high tensions of ether. Furthermore, an animal that has been deeply etherized for a short time will develop the signs of shock following exposure of the abdominal viscera seemingly quicker than a normal animal.

The relation of shock to the trauma and to exposure incident to the operation depends on many factors. The most important of these are the site of operation, the character of the operation, and the duration of the operative procedure.

Hemorrhage is a factor which complicates a majority of clinical reports of shock. While many undoubted cases of surgical shock occur in which hemorrhage could not have been a factor, it has been present in many cases. I have been able to demonstrate this relationship between shock and hemorrhage from the experimental standpoint [8] [9].

The question of whether a patient in shock should be given an anesthetic and operated is still unsettled. Anesthetists and surgeons of large experience may be found on the affirmative and on the negative side. The experimental investigator has not been able definitely to settle this question but the weight of experimental data seems opposed to operative interference in shock when such interference is not absolutely essential to save life.

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*Read during the Seventh Annual Meeting of the American Association of Anesthetists, at Atlantic City, June 9-10, 1919. From the Division of Experimental Surgery and Pathology, Mayo Clinic.

CORROBORATION OF EARLIER CONCLUSIONS.

In general, my earlier conclusions with regard to experimental shock have been corroborated in the whole or in part by recent investigators. Briefly, the most important of these conclusions are:

1. Clinically, certain cases of shock develop so quickly after the exciting agent that it seems the condition can only be due to a primary impairment of the nervous system. So far it has been possible to produce such a condition experimentally in but a few instances, and in these the experimental production was associated with inhibition. It would seem that inhibition is of more importance than excitation.

2. A condition simulating clinical shock, which developes sometime after the exciting agent, can be produced experimentally by diverse means. The only method which could be comparable with regard to precedure is by exposure of the abdominal viscera. Of such a condition produced experimentally the following facts are known: (a) The vasomotor center is not the primary cause, although it is probably impaired by the condition of low blood pressure[6 8], (b) the cardio inhibitory center is not primarily impaired[8], (c) the heart is capable of performing its work if enough blood is supplied to it although it undoubtedly is affected by the long continued condition of low blood pressure[2 8], (d) the condition is not due to a primary disturbance of respiration[8], (e) the condition appears to be due to a loss of circulating fluid[8 9], (f) the process as determined in the condition of experimental shock produced by exposure of the abdominal viscera can best be described by quoting from one of my previous articles[10].

"When the great delicate vascular area of the viscera is first exposed to the air, changes of temperature and handling, there is an immediate dilatation of all the arterioles in the exposed area. Rarely a short period of construction precedes the dilatation. As a result of this dilatation of the splanchnic arterioles blood pressure decreases. The splanchnic capillaries and veins are markedly distended, which may be due to one or all of the following causes: A local inhibition of vasomotor tone, an active dilatation, changes in abdominal pressure, and venous obstruction. On the whole, the process resembles the first stage of acute inflammation and does not appear to differ essentially from the phenomena as observed in the classical experiments on the subject. After this initial fall in blood pressure the condition of the animal may remain stationary or even slightly improve. However, as the loss of tone and paralysis of all the tissue involved take place, the blood pressure progressively falls, the temperature becomes subnormal and the animal develops profound shock. The loss of circulatory fluid and changes in temperature quickly imperil the life of the cells of the rest of the organism and death usually results from anemia of the medullary centers, particularly the respiratory. At the time the viscera are exposed and during the period that shock is developing, the vasamotor center increases in tone and the untraumatized arteries constrict. The amount of this constriction depends on their previous condition and the degree of splanchnic dilatation. During this time the center will usually respond to reflex stimulation and asphyxia, which demonstrates that it is still active although not functionating to its maximum extent. When the state of shock is fully developed it is usually, but not always, possible to obtain a response of the center, due to the long-continued low blood pressure or to the fact that all untraumatized arteries are constricted to their maximum extent, or that the great splanchnic area through which most reflex responses of blood pressure are produced is completely paralyzed."

Several important advances have recently been made in the treatment of shock, both by clinical and experimental investigation. I shall briefly review some of my previous work on the subject [11 13].

The treatment of shock may be divided into (1) general measures, (2) use of drugs, and (3) attempts to restore fluid volume. Some of the general measures, such as applying heat, etc., are universally practiced and both clinically and experimentally have been found of value. The use of drugs either the stimulants, of which strychnin is an example, or the vasoconstrictors, such as adrenalin, has not been shown to be of much value in experimental shock. An anesthetist's careful investigation of the use of these drugs in known and controlled cases of shock would be of great value. Many artificial fluids have been developed for infusion in the treatment of shock. Chief of these are (1) sodium chlorid, physiologic and hypertonic, (2) sodium bicarbonate or sodium carbonate (Fisher's solution)[3], (3) glucose, (4) sodium sulphate, (5) cane sugar, (6) gelatin (Hogan's solution)[7], (7) acacia (Bayliss' solution)[1], and (8) combinations of these, as acacia, glucose, and sodium sulphate [13], acacia and glucose[2], etc. It may be concluded that the so-called colloidal solutions, those containing acacia and gelatin give the best results; the addition of glucose to the solution definitely emphasizes its value. The alkalin solutions are of more value than physiologic sodium chlorid solution, and a hypertonic sodium chlorid solution produces better results than a physiologic one. None of the artificial solutions produce as good results as blood. Experimentally blood serum has given as good results as whole blood.

Discussion.

From this brief review of the known facts concerning experimental surgical shock and its treatment, and from clinical investigation, it seems that the following discussion of clinical shock is justified.

All cases of shock may be divided into two general groups: those which follow immediately after the exciting agent, and those in which a time interval occurs between the development of the condition and the trauma.

It would seem that most of the cases in the first group, which includes most of the classical examples of shock given in the literature, are dependent more or less primarily on a reaction of the nervous system. If the primary factor in these cases is the nervous system, inhibition would seem to be of more importance than excitation. I have shown experimentally that under certain conditions inhibitory stimuli will produce death. It is reasonable to suppose that under various other conditions and other stimuli an acute condition can be produced.

The primary factors of a majority of cases of surgical shock are quite varied but a uniform end result is produced which probably accounts for their common symptoms. This end result seems to be a loss of circulating fluid. Under normal conditions the changes in the permeability of the cells, their water content, etc., are such that a sufficient and practically constant volume of fluid is furnished the blood. The mechanism of fluid volume is so regulated that the fluid intake, fluid outgo, mass of circulating fluid and fluid content of the tissue cells are mutually interdependent. Changes in any of these factors must throw into action a mechanism which attempts to compensate for these changes. In shock we may have any one or more of these factors primarily or secondarily involved and it seems to me that most of the known facts of experimental and clinical shock can be explained in terms of impairment of these factors.

A few instances are cited in which a decrease in fluid intake apparently is of importance in shock. It seems to be a clinical fact that patients who have vomited persistently before operation do not react well after operation. From my experiments it appears that the withdrawal of fluid for a few hours before beginning an experiment predisposed the animal to shock. Further data is being obtained on this point. In contrast to this one may compare the patient who receives a hyperdermoclysis or proctoclysis during or immediately after operation.

There are a few instances of changes in fluid output which may have a bearing on shock. It is a well known observation that in experimental shock due to exposure of the abdomnial viscera a large amount of fluid is lost from the exposed visceral surface. This no doubt plays but a slight part in clinical shock. The poor reaction of the purged patient is probably due to the loss of fluid. The fluid lost through excessive sweating of the patient undergoing operation is also a factor in shock.

Probably the majority of cases of surgical shock are due to a decrease of circulatory fluid brought about by external loss (hemorrhage) or an internal loss following damage to tissue cells. I believe then an explation of most cases of shock will involve one or both of these factors.

The relation of external loss of fluid (hemorrhage) to shock has been repeatedly discussed but it is of so much importance that it should be reviewed, briefly, at least. I have shown that a hemorrhage during anesthesia will produce all the signs of shock except, in some instances that of low blood pressure[8]. Furthermore in shock due to exposure of the abdominal viscera the loss of circulating fluid is sufficient to produce all the signs of shock[9]. Both of these findings have been corroborated [4]. It would seem that the common symptoms of shock and hemorrhage are dependent on the common loss of circulatory fluid.

Shock and Hemorrhage.

Recently I have performed some experiments which again emphasize the relationship between shock and hemorrhage. If an etherized animal is bled repeatedly of a small amount of blood it is found that at first each hemorrhage produces a slight decrease in blood pressure which is quickly corrected. However, as the small hemorrhages are repeated a point is finally reached at which the pressure does not fully recover, and later does not recover at all; there is a total failure of compensation of the vasomotor mechanism and the mechanism for controlling fluid volume. If only one or two small hemorrhages are produced and the abdominal viscera are then exposed for a short time it is found that although compensation occurs before the trauma it does not afterward. The exposure of the abdominal viscera produced the same effect as the repeated hemorrhages. If the abdominal viscera of an etherized animal are exposed for a very short time and then replaced the condition of the animal remains good and shock does not develop. However, if at the time the viscera are replaced the animal is also bled a small amount, much too small to produce a permanent effect by itself, the animal is very apt to develop the symptoms of shock. The experiment may be varied by substituting some other procedure, such as deep etherization, for the abdominal trauma and the small hemorrhage will usually produce a marked effect.

These experiments would seem to show that the effect of hemorrhage depends in a large measure on various factors. A combination of deep anesthesia, operative trauma and hemorrhage is probably the most common cause of operative shock.

Internal loss of tissue fluid due to tissue injury seems to be a most potent cause of shock. When body cells are damaged their ability to control their water content and permeability seems also to be impaired. If the amount of tissue damaged is sufficient the entire mechanism for controlling fluid volume is impaired and the decreased circulation produces all the clinical signs of shock. It seems that many forms of tissue injury will produce this result. The initial factors may be quite varied. As was previously stated, in experimental work a decrease in blood supply to a relatively large volume of tissue is the most common factor. Excessive heat and cold also will damage tissue and produce shock. The employment of drugs, toxic substances, probably some even arising from injured tissue cells themselves, will produce the same end result[12].

BLOOD PRESSURE.

Few surgeons will make a diagnosis of shock in a case in which a low blood pressure is not present and it is undoubtedly true that the low blood pressure is the most important complication to treat. Nevertheless, as Meltzer first pointed out, a patient may have all the signs of shock without a low blood pressure[15]. I was able to produce such a condition experimentally both by exposure of the abdominal viscera and by hemorrhage[8]. These results have been corroborated[2] [4]. It seems that in such cases vasomtor compensation has been able to maintain blood pressure against the decreasing blood volume, although at the expense of the blood supply to the tissues.

POSTOPERATIVE SHOCK.

Probably no better example of the application of the data and theories derived from the work on experimental shock can be made than an attempt to explain the failure of reaction after operation which is termed postoperative shock. Such a condition is undoubtedly quite complex but a partial analysis of the possible factors involved can be made; it may best be discussed by a consideration of the factors involved before operation, during operation and after operation.

Before operation the most important points to consider are those discussed under fluid intake. If the fluid content of the patient is not up to normal, due either to factors associated with the pathologic condition present, vomiting, fever, etc., or to faulty preparation, purging, etc.

During operation the most important factors enter. The anesthetic is of great importance and may aid in producing the condition either by the direct depressing action of the drug, or by the indirect result of this action. The direct action produces depression of the circulation and respiration and a loss of muscle tone. These in turn produce a decrease in tissue nutrition and resulting tissue damage. The amount of damage seems to be proportional to the initial irregularities of the anesthetic and the depth of anesthesia. Hyperpnea and asphyxia are to be considered but probably most important is whether or not the anesthetic is pushed to the point where a decreased respiratory pump and loss of muscle tone fails completely to return the blood to the right side of the heart.

The part operative trauma plays varies but in general it is proportional to, (1) the degree of hemostasis, (2) exposure of the abdominal viscera, (3) changes in normal pressure relations, as opening abdominal and thoracic cavities, and (4) the production of nerve reflexes.

Postoperatively the most important factors are restoration of fluid volume, and elimination of the anesthetic. From the experimental standpoint it seems to me that the most important result of administrating carbon dioxid is the stimulation of respiration, thus more quickly eliminating the anesthetic.

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A STUDY OF THE TOXIC EFFECT OF GENERAL ANESTHETICS IN NATURALLY NEPHROPATHIC ANIMALS; AND PREVENTION OF THE TOXIC ACTION.*

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During the past few years several investigations have pointed out the frequency with which naturally acquired nephropathic processes occur in the kidneys of dogs. Such observations have been made by Ophuls[1], by Pearce[2], and more recently by Dayton[3].

A few years ago a rather extensive study of these naturally nephropathic processes was taken up in this laboratory, with the object in view of classifying such conditions and in the second place of studying the naturally acquired kidney injuries from a point of view of the physiology of the kidney and finally for using such material in which to produce some acute injury by various nephrotoxic agents.

In the purely pathological study, this chronic kidney material was found to fall in a general class of chronic kidney injuries, in which a productive inflammatory reaction occurs, leading to some form of secondarily contracted kidney. In two of the animals, the changes in the kidney, coupled with the changes in the vascular tissue of the kidney and the vascular changes in general, permitted a classification of the kidneys from these animals as primarily contracted kidneys.

In the first and larger group of chonic nephropathies, the initial injury appeared quite clearly to take place in the glomeruli, leading to a chronic glomerulo nephritis. In such lesions it was impossible to separate the capsular from the intracapillary changes. In these kidneys the tubular epithelium was well preserved. This observation of the lack of correlation between the degree of chronic glomeruli injury and tubular injury has very recently been pointed out by Stengel, Austin and Jonas[4], as occurring in certain chronic nephropathies in human material. From this very brief account of the chronic naturally acquired pathology, this group of animals, it will be seen, offers an excellent opportuniity to study the functional capacity of the kidney when its vascular mechanism is severely injured with the epithelial element of the kidney only slightly participating in the damage, and the material also furnishes the opportunity of studying the effect of the susceptibility of the kidney to certain injurious agents, such as anesthetics, not only from a pathological point of view, but from the standpoint of the kidney's function.

Observations of Naturally Nephropathic Animals Prior to an Anesthetic.

Twenty-one animals have been used in this series of experiments. The animals were kept in metabolism cages, given 500 cc. of water daily by stomach tube, and fed on a diet consisting of bread with a small amount of cooked meat. The urine was examined twice in each 24-hour period. The examination consisted in the ordinary qualitative examination for albumin, acetone, diacetic acid and the centrifugilized urines were examined for tube casts. The Marriott methods were used in determining the reserve alkali of the blood and the carbon dioxid tension of alveolar air.

Blood urea examinations were made by the method of Marshall, as modified by Van Slyke and Cullen[5], and the phenolsulphonephthalein test was conducted according to the method outlined by Rowntree and Geraghty[6]. These examinations have shown a trace of albumin in the urine from the various animals. The number of casts in the different urines has varied very much—from only a few hyaline casts in several fields to numerous granular casts in the urine of other animals. The urine failed to show either the presence of acetone or diacetic acid. The reserve alkali in all of the animals, with one exception, has varied within the range of normality—from 8.0 to 8.15. In the exception to this, the reserve alkali was 7.9, and it is of some interest that the urine of this animal showed the largest amount of albumin—1.2 grams—and the casts in the urine were very numerous and principally of the granular type. The carbon dioxid tension of alveolar air has shown a correlation with the reserve alkali of the blood. The blood urea determinations have varied from 0.015 to 0.028 per cent. The output of phthalein has varied from a minimum of 52 to a maximum of 69 per cent.

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*Read during the Seventh Annual Meeting of the American Association of Anesthetists, at Atlantic City, Jnue 9-10, 1919. From the Laboratory of Pharmacology, University of North Carolina.

From the above outlined findings, taken in conjunction with the pathology of the kidney as shown at autopsy, it seems permissible to conclude that these animals had a chronic glomerulo nephritis resulting in a type of secondarily contracted kidney, which is comparable not only in its pathology but in the blood of urine findings with similar conditions that occur in the human material.

The animals of this group were anesthetized either by morphin-ether, or by Grehants anesthetic—the active anesthetic constitutent of which is cloroform. Each animal so anesthetized was controlled by a normal animal that had been subjected to the same examination as outlined for the nephropathic dogs. The anesthesia for the control and nephropathic animals lasted 1½ hours, and at each half-hour interval during the anesthesia the urine was collected and measured, and the blood of the animals examined by the method indicated for its reserve alkali content. At such half-hour intervals, different diuretic substances were given the animals, and their effect on the functional response of the kidney noted in the output of urine during the following half-hour period. The diuretic solutions employed were as follows:

Theobromine, 1 per cent.
Caffine, 1 per cent.
A 0.9 per cent solution of urea.
A 20 per cent solution of glucose.
Pitruitrin 0.5 cc. per animal.

The difference in response of the normal control animal, as compared with a naturally nephropathic animal during the course of the anesthesia, is very striking. All of the control animals were freely diuretic after the establishment of a satisfactory state of surgical anesthesia. The output of the urine varied from two to eight drops per minute. The reserve alkali of these animals and the tension of alveolar air carbon dioxid was normal at this period of the anesthesia, and remained normal for the hour and a half of the experiment.

When such animals were given any of the diuretic solutions previously mentioned, there occurred an increase in the formation of urine. The output was greatest from the glucose, and from the pitruitrin.

When a similar degree of surgical anesthesia had been produced in the naturally nephropathic animals, the result was a harp reduction in the output of urine. Only one of the animals was forming urine at this early stage of the experiment, and the output in this animal was only two drops per minute. The remainder of the naturally nephropathic animals at this period of the experiment had become anuric. During the course of the experiment, the reserve alkali of the blood showed a progressive reduction in all of the animals, so that by the end of the hour and a half period of the experiment, the reserve alkali readings varied between 7.8 to the very low figure of 7.45. During this period, the same diuretic solutions were given these animals as were administered to the control animals. The nephropathic animals which at the commencement of the experiment was forming two drops of urine per minute, responded half an hour later to the theobromine with an increase of urine to ten drops. All of the other animals remained non-responsive to the various diuretic solutions. The state of anuria which was established by the time these animals had become completely anesthetized persisted throughout the experiment, and was uninfluenced by those diuretic solutions which in the normal control animals were of distinct diuretic value.

These observations permit rather clearly of the following deductions:

The use of an anesthetic in such naturally nephropathic animals leads to a progressive reduction in the reserve alkali of an animal's blood, and associated with this change in the acid base equilibrium there occurs a rapid reduction in the formation of urine, or the establishment of a state of anuria which is uninfluenced by various diuretic solutions.

Prevention of the Toxic Action.

With these observations in mind, an attempt has been made by the use of an alkaline solution given intravenously, to protect the kidney of such naturally nephropathic animals against the toxic effect of an anesthetic.

In this series of experiments, 12 naturally nephropathic animals have been used, and a similar number of naturally nephropathic animals were employed for controls. The control animals were given, an hour prior to the anesthetic, 25 cc. per kilogram of a .09 per cent solution of sodium chlorid, while the naturally nephropathic animals, which were not to serve as controls, were given a similar amount of sodium carbonate solution equimollecular with a 0.9 per cent solution of sodium chlorid. The animals were then anesthetized by either morphin ether or Grehant's anesthetic and observations made at half-hour intervals for the duration of the experiment, which lasted an hour and half similar to the observations previously detailed.

The naturally nephropathic animals which served as controls. and which received intravenously the sodium chlorid solution; became anuric by the time a state of satisfactory surgical anesthesia had been produced. The reserve alkali of the blood showed a reduction which varied between 7.9 to 7.8, and during the course of the anesthesia a progressive reduction in the alkali reserve occurred, so that at the termination of the experiment, the alkali reserve varied between 7.7 to 7.6. All of these animals remained anuric during the course of the experiment, and they were furthermore not responsive to diuretic solutions of theobromine, urea, glucose, and pituitrin.

The naturally nephropathic animals which received the sodium carbonate protection were all diuretic at the completion of the anesthesia. The reserve alkali varied between 8.25 to 8.15. During the course of the anesthesia these protected animals also showed the effect of the anesthetic in reducing their alkali reserve, so that at the termination of the experiment, the alkali reserve in these protected animals varied between 8 to 7.85. Those animals of the group which showed the least reduction in their alkali reserve—a reduction not under 7.9, remained diuretic during the course of the experiment, and were furthermore responsive to these diuretic solutions which were of no value in the control animals. However, those animals that received the sodium carbonate and which during the anesthetic showed a reduction in their alkali reserve to a point as low as 7.85, became anuric and were non-responsive to the diuretic solutions.

These observations permit a continuation of the observations made with the first group of nephropathic animals:

1. That the use of an anesthetic effects a reduction in the alkali reserve of the blood, which is very marked in naturally nephopathic animals.
2. That such a reduction is associated with a decrease in kidney function.
3. That if the alkali reserve of the blood during an anesthetic can be kept above 7.9, the animals not only remain diuretic but they remain responsive to the various diuretic solutions.

The histological study of the kidneys of these animals which have either remained diuretic during the experiments or have become anuric, show that in the former group there is but little evidence of degeneration of the tubular epithelium, and but a small amount of fat in the apithelium. The animals, however, which have shown a marked reduction in alkali reserve, and have become anuric and non-responsive to diuretics, show a severe swelling and necrosis of the tubular epithelium, especially that of the convoluted tubules, and the occurrence of large amounts of fat in the tubular epithelium, especially that of the ascending limb of Henle's loop.

This experimental study apparently points very clearly to the danger of an anesthetic in a naturally nephropathic animal. It furthermore shows that this danger is definitely associated with the ability of the anesthetic in a given animal to induce a disturbance in the acid-base equilibrium of the animal's blood in favor of its hydrogen ion content, and it furthermore points out that it is possible, by the judicious use of an alkaline solution, to maintain in some degree a normal acid-base equilibrium against the anesthetic, and that if this can be accomplished, the degenerative changes in the kidney, affecting especially the epithelium of the convoluted tubules, may be prevented, and the functional capacity of the kidney in some measure retained.

SAFETY FACTORS IN THE TEAM-WORK OF OPERATOR AND ANESTHETIST.*

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"There is nothing new under the sun" is an old and very true adage. While there are new things arising frequently, there are often new applications for old things. I beg leave to ask your indulgence if the thoughts expressed in this paper are not entirely new. The purpose is chiefly to emphasize and lay special stress on ideas and facts already known, but not sufficiently heeded by all who should heed them. A mere perusal of the title of this paper suggests the presence of danger. How fortunate that we should live in an age that makes use of the slogan "Safety First." The railroads have their "Stop, Look and Listen" signs, which we have all encountered while touring. We have received the admonition or noticed the sign of "Watch your Step;" the streets of the cities have their traffic officers or signs "Keep to the Right;" machine shops have been compelled by law to safeguard all machinery. In short in civil life it has become not alone a necessity but a habit to safeguard life where there is any possible danger. Have we, as members of the medical profession, taken all the precautions we could or should have taken? To this we can answer "Yes" and "No."

Inasmuch as this paper deals only with operator and anesthetist, the remarks will apply only to

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*Read during the Fifth Annual Meeting of the Interstate Association of Anesthetists, before a Joint Session with the American Association of Obstetricians and Gynecologists, at Cincinnati, September 15-17, 1919. **Chairman's Address.**

those members. Surgery, properly considered, is a therapeutic procedure. There is always an element of danger in connection with it, even though a general anesthetic is not administered. The dangers attending surgery and anesthesia, have in great part, been recognized and much has been done to overcome and prevent them and investigations keep up to prevent and minimize those which have not yet been conquered. We are all proud to note the safety signs that have thus far been erected to guide surgeons and anesthetists, in order that the surgical patient may have a safe journey for the relief and eventual cure of his ailment.

NEED OF EDUCATION.

To those who have given thought to the matter of safety, there always arises the short-sightedness of our medical colleges in not properly training the medical student in these branches. We appreciate that an anesthetic is administered to allay pain and overcome muscular contractions. The fundamental teaching for this art, as Flagg calls it, must come from the medical school. Dr. Isabel Herb, in her paper, "The Anesthetist on the Hospital Staff," says: "The slogan to be adopted, the safety device to prevent anesthetic deaths, is education." Dr. W. D. Gatch, in his paper "Anesthesia in Curriculum and Clinic" very forcibly paints the defects in teaching. He suggests a co-relation of the subjects so that there is a very forceful application of the subject of anesthesia in conjunction with physiology, pharmacology, internal medicine and operative surgery. As Gatch further says, "Where would the advances in surgery be if it were not for the advances in anesthesia?"

The surgeon requires education just as much as the anesthetist. The real surgeon seeks intensive training under an able leader before he branches out for himself. It is not altogether how good an operation can be performed, as it is, how much good will come from the operation if performed. The proper training of each and the working together of both will result in good team work.

VALUE OF TEAM WORK.

One can state with perfect safety that team work in surgery has its advantages. It is no longer an experiment but rather a well-established fact. Encouragement is given the anesthetist, who being recognized as a full-fledged specialist, assumes his place in the surgical team, not alone as the one who administers the anesthetic, but as a consultant. He helps weigh in the balance, the advisability of operating, the selection of the time that will be safest to operate, and makes the choice of the anesthetic. He helps prepare the patient for operation. To do this the anesthetist must be a trained physician.

A further object of this trained surgical team is, not alone to prevent death but to overcome or at any rate, minimize the discomforts attending surgical operations. This training having brought about specialization, in turn encourages further study and the discovery of new and hidden paths that would otherwise be unknown.

We cannot, to-day, overlook the fact that, meetings of this kind, where two or more special branches of medicine meet in joint session must bring benefit to all concerned. It should be encouraged, because in open sessions of this kind the short-comings of all can be brought out and remedies suggested. This will exemplify that old saying, "Always speak well of yourself, the other fellow will take care of your faults."

DUTY OF THE ANESTHETIST.

As was stated before, the duty of the anesthetist is not merely to administer the anesthetic agent, but to help prepare the patient for the operation. When should he begin and what preparation is needed? When it is possible the anesthetist should begin his work when the surgeon has decided that an operation is needed. It is advisable to have the patient in the hospital at least 48 hours before the operation. For some cases it may take several days to a number of weeks to properly prepare the patient. A full physical examination of the patient is advisable. With this there should be a quantitative and qualitative examination of the urine. We are no longer satisfied with a simple chemical eximination of the urine. A full knowledge of the quantity of the urine for 24 hours, specific gravity, presence or absence of albumen, sugar, acetone, diacetic acid and casts. When possible a functional test should be made. The examination for acetone before operation is too often neglected. It should be made a routine practice.

A full blood examination including the clotting time of the blood is another safeguard. While it is perhaps the rare thing to find a delayed clotting time, we may save ourselves considerable anxiety if this test is made before the operation. The work of McKesson, Miller and others on "Blood Pressure," show the great importance of this valuable, but neglected examination. The work of Polak on "Blood Pressure" and "Phthalein Output" shows very conclusively a safety first sign if properly heeded. All these examinations are given, not for the purpose of placing a mountainous obstacle to surgery, but merely to indicate some of the safety signs that will spell success to the surgeon and gain the best end results for the patient. At this point, let me speak a word in favor of the great work done by the clinical laboratory. All too little use is made of this branch in our preoperative preparation of the patient. One of the most trying and obstinate obstacles we at times encounter is acidosis. The laboratory can be of great help to us in this condition and proper diet and medication will overcome or mitigate this condition to such an extent that surgery can be undertaken with perfect safety, and with greater comfort than would otherwise be possible. The laboratory work in diabetic cases is of inestimable value.

We often meet the argument against this preliminary stay in the hospital, that due to the great nervousness of the patient, it would react unfavorably. This is true, if no explanation is given the patient, why this extra time is needed. A great trouble is that the thinking is too often done for the patient and not by the patient. Outside of the great good to the patient by these examinations, there is another derived benefit, *viz.*, becoming hospitally acclimated and becoming acquainted with the nurse who is to have charge of the case.

It is especially in genito urinary surgery where this preoperative care and preparation of patient shows up so vividly. With this preoperative care. patients that formerly were doomed to die without operation, are now made fit subjects for surgery that affords not only relief, but oft times, cure. At any rate, comforts are given where only misery was possible before.

Another great advance in preoperative preparation is the care given the gastro intestinal tract. No longer is the surgical patient starved and purged. How true the comparison of surgical patient with the athlete in preparation for a race. We can only say that common sense, rather than the continuation of old time ideas without reason, prevails. The better physical condition the patient is in at time of operation, the happier, and shorter the convalescence.

By giving the patient the regular diet the day before the operation, supplemented as suggested by Glagg, with ½ pound of chocolates, it helps to neutralize the acidosis caused by the anesthetic.

Preoperative Medication.

Purging, or active catharsis, is not only useless, but one of the great causes of postoperative gas pains and distension. The patient should have ample sleep and rest before the operation. If necessary some sedative as bromide, chloretone or veronal should be given the night before to produce a good sleep.

Shall we use preoperative medication? While there is a great deal of negative evidence, I believe there is far more positive evidence that it should be used. It has been my rule for a long time to use the preliminary medication in the majority of cases. When I use it I give morphin 1/6 gr., or pantopon 1/3 gr., with atropin 1/150 gr., in ether cases and hysocin 1/150 gr., in gas-oxygen cases. While very occasionally I have seen a slowing of the respiration due to the morphin, I have never regretted its use in a single case. The value of morphin or pantopon, both before and after operation, is too little appreciated. There may be a marked disadvantage with inexperienced anesthetists when this preoperative medication is used, but with the experienced anesthetist, who relies on no one sign or symptom to indicate the condition of the patient, there can be no disadvantage. If there is an idiosyncrasy or a known contra-indication no preliminary narcotic medication is used. The length of the operation and the type of operation also influence its use. My choice of late, has been to use the medication sub-lingually, rather than hypermatically. The action is fully as good and the psychic effect on the patient is also very marked.

Choice of the Anesthetic.

The next thought after proper preparation of the patient and designation for time of operation will be the choice of the anesthetic. It is really surprising to read and hear the differences of opinion as to the best anesthetic agent. Statistics are of no avail in helping us to decide. It almost seems that certain sections have fads and fancies in the choice of anesthetics. It is a known fact that all anesthetic agents are poisons. It is also a fact that only experienced physicians should administer these agents. With the inexperienced we know that ether is the safest anesthetic. With the experienced, nitrous oxid and oxygen is the safest. It is also the pleasantest and has the least after effects. Those who use gas-oxygen to any extent agree that there are practically no contra-indications to its use. A short time ago, I read a paper in which the chief contra-indication to gas-oxygen was noted to be the surgeon. That still holds true where the surgeon is not accustomed to work with gas-oxygen anesthesia. The surgeon who has been in the habit of working with a deep ether anesthesia must be taught to work with gas-oxygen to have it work successfully. It is really a re-education of the surgeon. Once accustomed to its use he will work with as much ease and comfort as he did before with ether. The appealing factor in this change is the patient. One always hears how pleasant it is to go under, how pleasant the awakening. The surgeon is surprised at the good condition of the patient, even after a long operation. It is conceded that there is not the relaxation with gas-oxygen that there is with ether. In a certain class of cases a small amount of ether may be necessary to produce the desired amount of relaxation. The success comes in the team work of operator and anesthetist. It must be a give and take proposition. The greatest fault with gas-oxygen will be found in abdominal surgery. In great part this will be overcome if the operator will make a sufficiently large incision to begin with, so that he can make all necessary examinations without being compelled to use great force in inserting his hand into the abdomen. The position of the patient on the table to insure the greatest amount of relaxation to the involved parts is another great aid. Guthrie and others have commented most favorably on the use of the slight Trendelenburg position when starting the anesthetic. This has its advantages in a number of cases. On the other hand there is great danger in extreme Trendelenburg, especially if long continued. Good judgment must prevail in knowing the patient and how much Trendelenburg position will be tolerated and for how long. Proper relaxation of the effected parts may be obtained by pillows, sandbags or with the newer type of operating table by adjustment. This relaxation helps, not alone during the operation but also on closure of incision.

The one great field that is surely but slowly adopting gas-oxygen is obstetrics. Chloroform has done noble work in obstetrics. It will never be totally replaced by gas-oxygen or any other anesthetic. It is a very valuable anesthetic agent when properly used and in properly selected cases. Ether will, of necessity, be the agent most largely used. It has its indications and in many cases its advantages over any other anesthetic. No doubt the difference in cost has been a drawback to the greater use of nitrous oxid. Greater experience has thus been gained with ether and when properly administered it compares quite favorably with gas-oxygen.

Sonnoform, which is a combination of ethyl chlorid, methyl chlorid and ethyl bromid, is largely used by dentists. It is of great value in short anesthesias where it will give greater relaxation than gas-oxygen. It is also largely used to induce ether anesthesia in place of gas. It has a further advantage in not requiring any large apparatus for its administration.

Ethyl chlorid has its advocates who are as enthusiastic as others are for ether or gas. Its chief use is for short operations or as a preliminary to ether especially with children.

The success of the administration of any anesthetic agent lies absolutely with the administrator rather than with the agent or apparatus used.

HANDLING EMERGENCIES.

The use of oxygen with any anesthetic is of great value. It increases the safety without diminishing the anesthetic value. It is a stabilizer of blood pressure, diminishes or overcomes nausea and vomiting and facilitates an earlier return to consciousness. In obstetrics, I have found it of great value in resusciation of the new-born babe.

Emergencies are always to be considered and are best met when there is team work. It may be necessary in some cases to transfuse before operation. The experienced anesthetist watches the patient so closely at all times that he can give ample warning to the operator to speed-up or even cease his work, if the patient's condition becomes unfavorable. If blood pressure observations are taken during an operation one will find evidence of danger long before it comes on and will be able to meet it, almost before it arrives. The anesthetist should know what emergency measures should be applied if occasion demands. The operator should at all times, use such speed as is commensurate with safety and good technic. All bleeding should be controlled at once. Unnecessary bruising of tissue should be avoided.

Surgical shock is a nightmare, that as yet has not been fully solved. The theory of Cannon, that it is due to absorbed toxines, arising from the bruised tissues, may explain why cases of long duration with rough handling suffer shock. We know that hemorrhage is one of the causes of shock, and nerve irritation another cause, but there are cases that as yet have received no satisfactory explanation for the appearance of shock. While no doubt further investigation will eventually solve this problem it behooves us in the meantime to consider all the supposed causes of shock and try to avoid them.

POSTOPERATIVE CARE.

What care will we now give the patient following the completion of the operation? After the dressings are applied, the patient, properly protected, is taken back to bed. The bed should be warm, hot water bottles should be placed about the patient to keep up heat, the room should be bright enough to recognize change of color in patient. The position of the patient in bed should be such as to afford the greatest comfort to the patient, ample pillows being supplied to produce this condition Enough anodyne should be ordered to give relief from pain for the first 48 hours. Water should be given as soon as the consciousness is fully established. Rectal injections of alkaline solutions with or without glucose should be ordered if the case demand the same. Feeding should be started at a very early period. Careful watching of the patient is necessary to detect change of color or pulse rate. Absolute quiet should be enforced for the first few days.

If the anesthetic has been properly administered a very early return to consciousness is assured. This means that there is a minimum amount of anesthetic for the patient to eliminate, there will be less time required in watching till full return of consciousness, and the discomforts attending return of consciousness will be practically nil.

In conclusion I wish to emphasize, first: a change in college curriculum to meet suggested requirements. Second: a greater preoperative care and examination of patient. Third: greater team work in our hospitals.

In limiting my remarks to operator and anesthetist, it was not with the idea of minimizing the value of other members who are a part of the surgical team. There must be a concerted action of all in order to have success.

1208 South Salina St.

SURGICAL BARRAGE.*

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and
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The greatest protective development in modern warfare was the so-called *Barrage*. To be effective, every minute detail was worked out with the greatest precision. Started a few seconds too early or too late meant not only a possible failure, but even worse, destruction of one part of an army by another part of the same army. Team work was absolutely essential.

A *Surgical Barrage* may be defined as the process of surrounding the surgical patient with all the skill and refinement known to specialists in the various departments of medicine and surgery during the *Preoperative, Operative, and Postoperative Periods.* Surrounded with such a barrage, the patient may reasonably anticipate the lowest possible mortality rate, with the shortest and least uncomfortable morbidity period, the latter factor becoming more and more the aim of every thoughtful surgeon.

It is our hope to briefly, yet concisely bring before you certain of the elements making up this barrage, basing our conclusions not upon theory but experience.

VALUE OF STANDARDIZATION.

First of all, we have already noticed a marked advance in the safety line to the patient by the work started by the American College of Surgeons, in the Standardization of Hospitals. This not only mean a general awakening of hospital managements, thereby increasing the efficiency of the hospital, but is destined to have an enormous influence in standardizing surgery itself. Hospital managements when selecting a staff are beginning to give occasional thoughts to some other qualifications aside from a reckoning of the number of pay patients the proposed member has been rushing to the hospital. It is to be regretted that, in the past, the latter motive has all too frequently actuated the selection of staff members by many institutions, especially those of a sectarian type.

We regret, however, that the officers of the College have apparently overlooked one important factor in their otherwise valuable standardization work, and in a few instances have even given their individual influence to the lowering of standards. We refer to professional anesthesia which matter we will discuss further along in the paper.

PSYCHIC INFLUENCE.

In the field of Gynecology much is gained for the patient as well as for the profession, by a close alliance of surgeon and psychiatrist. The patient has been taught so many foolish and untrue things about herself; and the relations of her sex organs to the entire endocrine system as well as to the nervous system, are so complex that frequent consultations with a properly trained neurologist will often avoid useless and even harmful surgery.

The Gynecologist probably comes into contact with a higher percentage of chronically ill patients than does any other surgeon. He must therefore consider with unusual care the Preoperative and Postoperative Periods. Everything possible must be done not only to raise the patient's physical condition, but her psychology must receive special attention. She should reach the hospital and be received without an unpleasant experience whenever possible. Immediate preoperative purgation is to be avoided. Fluids, especially alkalines, are given freely. A good night's rest is assured by the use of sedatives and if absolutely necessary, some narcotic.

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We assume that a positive diagnosis has been made if such is a human possibility, and the work well planned before the hour of operating. This bespeaks smooth, rapid surgery, without bungling haste. All known means should be used to measure the patient's resistance, including carefully acquired knowledge of the kidney function and cardio-vascular system, as well as metabolism in general. We still continue to attribute much importance to the *Pulse Pressure Ratio,* a term used to indicate the relation between the pulse pressure and the diastolic pressure, and which we discussed at length in a former paper read before this society.

VALUE OF THE PULSE PRESSURE RATIO.

We have made systematic use of the principle ever since that time, just as we did for some years previous to the report. All cases are recorded and the records comprise most interesting data for study. Dr. Miller of Providence, R. I., has recently reported, following our plan in 1,000 consecutive cases, and stated that he has found it correct and of much value. In the same article, Dr. Miller puts forth an idea that we have adopted and found to have much to commend it. He divides his cases into three classes as follows:

The good risks: Patients free from organic disease, whose surgical condition is not especially serious.

The fair risks: Patients suffering from organic disease, but whose surgical condition is not especially serious.

The poor risks: Patients whose surgical condition is so serious or so far advanced as likely to result in a fatality.

All patients of the first class are expected to recover. If a fatality should occur from among this class the case should be carefully gone over to determine whether the preoperative prognosis was in error or if the work of the surgical team is blamable for the fatality.

As an example for the second class, an operation for appendicitis might be urgently required in the case of a patient whom the examination showed to be affected with diabetes. If coma and death follow such operation, the fatality will be considered beyond human control. If no examination and no prognosis had been made, the necessity for a lame explanation of the result would have arisen.

THE QUESTION OF ANESTHESIA.

With this classification, we are now ready to consider the question of anesthesia. Shall it be Local or General, and if the latter what agent is to to be used? Any surgeon who insists that there is but one form of anesthesia or only one anesthetic, is too partisan to be a real student. If one classifies his patients as above, and seriously considers the sort of an operation he is going to do, he will soon find need of several forms of anesthesia and several anesthetic agents.

It is not our purpose to discuss at this time the question of *Local anesthesia,* but before passing it, we wish it to be understood that in our judgment it may be used in the future much more than it has been in the past, owing to great improvement in the technic of its administration. (Personally if I were without the services of a professional anesthetist who was especially skilled in the use of nitrous oxid oxygen, I would do a larger percentage of my work under Local.—Moots.)

Ether has practically solved the question of immediate mortality rate, when properly administered, and is certainly the safest general anesthetic agent in unskilled hands. It also makes toward easy surgery. There are a few factors about it, however, that do not please the surgeon who is looking for ideal anesthesia. The odor while taking as well as following the operation certainly does not leave pleasant memories on the mind of the patient; the awful nausea; the interference with the function of cells and organs as proven by the laboratory; delayed deaths, not conscientiously attributable to the surgical traumatism alone are things we like to avoid.

In 1907 we became interested in nitrous oxid-oxygen. At first our difficulties were many; ignorance of the necessity of joint study and cooperation between surgeon and professional anesthetist, poorly devised equipment for administrtion, lack of experience in the signs of anesthesia produced by this agent, lack of ability on my own part to operate with minimum traumatism, being the principle causes in the light of our present knowledge. With these propositions mastered, we are today happy in the conscious enjoyment of a technic which leaves little to be desired. *However, the kind of anesthesia and the agent used to procure it is secondary in importance to that of the anesthetist. In fact, a professional anesthetist we believe to be the most important factor in the Surgical Barrage.*

We have considered all the arguments ever offered in favor of the non-professional anesthetist, and in times past were inclined to admit that in some of them there existed a partial truth, but with our profession home from the war and such a goodly percentage ready to devote their lives to the study *and practice of anesthesia, there now exists no reason for any surgeon who is unselfishly devoted to raising the standard of hospitals and surgery, to encourage in any way non-professional anesthesia. All pro-arguments when well disected fade away, and a new light upon the screen shows the real cause of the blustering arguments, viz: The surgeon in the big clinics was not happy in the thought of a fair fee going individually to a professional anesthetist and the surgeon in the smaller cities hoped to encourage the family physician to send more cases by having him give the anesthetic. And it is quite probable that the surgeon has sometimes used the matter of the anesthesia as an excuse to give the practitioner a fee somewhat larger than the skilled anesthetist would have charged the patient.*

The question of the advisability of nurses administering anesthetics has recently been brought up before us. It is our conclusion after what we feel to be an impartial study of the subject that while some nurses may be taught to administer the safer agents in uncomplicated cases in a manner highly satisfactory to the operator, yet the principle is fundamentally wrong for reasons so numerous that we hesitate to embody them in this paper. We still maintain that the administration of a general anesthetic is the giving of the most powerful and dangerous drug at the most perilous time of the patient's life. During any major operation the anesthetist may be called upon to make one or several new diagnoses and prognoses, and this certainly constitutes the practice of medicine and even demands unusual skill.

Few surgeons know much about the subject of anesthesia because the subject has not been properly taught in our colleges and hospitals. Our hopes for this subject, therefore, lie in the encouragement we give the specialty of professional anesthetists. To them we must look for advances in their line. They must be considered in our discussions during the Preoperative as well as the Operative Period. We commend the report of the Committee of Anesthesia of the American Medical Association to the effect that: "Every Hospital, certainly every large hospital, should have as a regular member of its staff an attending anesthetist whose authority in his special branch should be as complete as that of the attending surgeons in theirs."

What is meant by a qualified, professional anesthetist?

For answer, we quote from Dr. Isabella C. Herb: "The qualified anesthetist is one who is capable of making a physical examination of the patient, can interpret laboratory findings, is familiar with operative requirements, able to weigh the evidence and select the most suitable anesthetic and the method of its administration for the particular case under consideration. These qualifications require not only a thorough medical education but special training in the theory and practice of anesthesia as complete as is required in the field of surgery or its correlated specialities."

It was with extreme regret upon our part, that upon our return from the war-ridden countries, we found the legislature of our own great state, Ohio, legalizing non-professional anesthesia. Already we hear the jeers of the non-medical cults concerning the all too apparent insincerity of some of our leaders regarding their desire to really raise the standard of the medical profession.

THE TIME FACTOR.

Another factor of much importance to the patient is that of the length of time required for her operation. While not advocating bungling haste, it is certainly safe to conclude that the briefest possible time only should be utilized for any surgical procedure. All other factors being equal, her morbidity period should be in ratio to the operating period.

There is a certain length of time, varying in every case, that may be termed the "Safety Period" for operation in that particular case. The operator who absolutely knows anatomy and can easily operate speedily will therefore save many border line cases that would be lost by a slow operator who would require time far beyond that "Safety Period."

SUTURES.

We have had no experience either during our Navy service nor in private work that have caused us to change our attitude upon the question of sutures. They should be absorbable, of the smallest possible size necessary to carry out their function, and so prepared as to be absorbed as soon as their function is ended.

SHOCK.

The subject of shock is an important one and should be considered in every abdominal section. Many brilliant discusions of the causes of this condition are to be found in the recent literature, and will not be reiterated here. We believe, however, that much practical good may be gained at this time, by keeping constantly in mind three factors as follows: Pathology, Surgery and Anesthesia.

Cardio-Vascular Depression being the outstanding symptom of the condition known as shock, it is reasonable to start with the proposition that what ever means enables us to determine the very beginning of this condition, is of the greatest importance.

Now when a cardio-vascular system is reacting normally, an increased pulse rate is accompanied by an increased systolic and diastolic blood pressures, and vice-versa. The pulse pressure is roughly half as great as the diastolic pressure and is the most direct evidence we have of the amplitude of the heart contraction, the best evidence of effective blood movement. In normal sleep, the pulse rate and blood pressures are lowered but their normal relationships are maintained; so are they in an ideal anesthesia.

But during surgical operations, so many factors enter to disturb the normal reaction of the circulation that we may have many combinations, with almost never a true *stimulation*, but very frequently a *depression* of the circulatory system. The changes occur so frequently with sometimes disastrous and sometimes innocent results, that it is most desirable to be able to differentiate between them and to anticipate their onset.

BLOOD PRESSURE RULES.

There is no form of anesthesia, there is no age of patient, there is no type of operation in which one expects to see an elevation of blood pressures during the operation. Our fears are from low blood pressures, rapid pulse rate, and heart fatigue.

Circulatory Depression or Decompensation is best divided for surgical operation into three degrees:

1. Safe. 10 to 15 per cent. increase on pulse rate without change in pressure. 10 to 15 per cent. decrease in blood pressures without change in pulse rate.

2. Dangerous. 15 to 25 per cent. increase in pulse rate with 15 to 25 per cent. decrease in blood pressures.

3. Fatal. Progressively increasing pulse rate above 100 with progressively falling blood pressures of 80 or less systolic and 20 or less pulse pressure, for more than 20 minutes.

The first degree is never fatal but may gradually merge into the second degree. The second degree, beginning shock, may be regarded as dangerous in the sense that it exhausts the heart and disarms it for defense against continued low blood pressures.

The third degree is always dangerous to the life of the patient. A vicious circle is established consisting of the low blood pressure, the reduced heart nourishment which in turn still further reduces the blood pressure, and so on progressively. This usually developes within 20 minutes after the third degree depression occurs and when once well established proves fatal at once or at most within three days. The time in which shock proves fatal depends upon the cardiac muscle reserve and the effectiveness of the treatment employed. Third degree depression may be present in a patient without the usual alarming signs, but after the vicious circle becomes established, evidences of shock become well marked.

VALUF OF BLOOD PRESSURE READINGS.

With the palpating finger, no matter how skilled, one cannot determine all the characteristics of the pulse or the pulse pressures with sufficient accuracy to be of much prognostic value as to the onset and degree of circulatory depression during a surgical operation.

Blood pressures and pulse determinations every few minutes during all of the more serious operations as well as in many of the so-called minor cases are a part of the duties of every anesthetist. The information regarding the patient's fitness for the operation, his reaction to certain procedures and the immediate prognosis can be gained in no other way with the same degree of accuracy

The procedure is made convenient and easy by fastening the blood pressure cuff to the right arm and snugly binding the stethescope below it with elastic webbing. Readings can then be made at will without disturbing sterile sheets and without losing the continuity of anesthesia.

PRESERVING MUSCLE TONE.

A suitable graphic chart is preferable as a record because the tendencies of the circulation are readily compared from time to time and because the prognosis based upon these tendencies and the character of operative work to follow, can be more accurately made.

Where nitrous oxid-oxygen was available in skilled hands the war has corroborated our previous observations that this form of narcosis is one of the best shock prophylactics we have.

It is not remarkable that nitrous oxid-oxygen should be safer in shock and in preventing shock than other anesthetics when one recalls the fact that muscle cannot be paralyzed with it.

The greatest responsibility of the anesthetist is to avoid relative over-dosing of the patient in an effort to please the surgeon who may be demanding a flabby musculature.

The relaxation is not confined to straited muscles of the abdomen and extremeties, but extends to the straited muscle of the heart. The effect is at once reflected by the pulse pressure and if pushed too far the diastolic pressure is also decreased showing the action upon smooth muscle as well.

The clinical study of blood pressure has convinced us that the final factor in shock is muscular exhaustion or an interference with muscular action. One thing is most apparent, the average patient having been profoundly anesthetized for extreme relaxation, is half shocked, a second degree depression, and it often takes but little trauma to complete the picture of third degree depression.

We might go on discussing the relation of pathology, of surgery, of anesthesia to circulatory depression and nearly all we could say would be old and familiar to all. Yet it would be of no value to Mr. or Mrs. John Doe if blood pressure determinations were not made during his or her operation to check up the technic of every member of the operating team that no unnecessary damage be done. In other words let us practice some of our knowledge in preventing shock.

SUMMARY.

We believe that there is a general knowledge of the advantage of professional anesthesia and that this factor will soon be within the reach of the majority of good surgeons. If, added to this great aid, the surgeon considers well the psychology of the patient; avoids active preoperative purgation; keeps the patient warm, and has her well filled with fluids; discreetly uses morphin; understands the pathology before him; does rapid, bloodless untraumatic surgery, he surrounds the patient with an effective barrage.

The Postoperative Period is characterized by the absence of meddlesome medication; by keeping the body warm and properly supplied with fluids, especially alkaline and often adding dextrose; all wound-dressings being exceedingly light and cool; absolute quiet for infected and traumatized cases while clean adbominal and pelvic cases should be moved about and gotten-up much earlier than formerly supposed. The opportunity offered the surgeon himself to benefit the patient by his advice and suggestions during this period, should be used with much thought and intelligent discretion.

THE ANESTHETISTS IN A NUMBER OF THE LARGER CITIES, SUCH AS NEW YORK, LOUISVILLE, TOLEDO, PROVIDENCE, SEATTLE, KANSAS CITY, SAN FRANCISCO AND LOS ANGELES, HAVE ORGANIZED LOCALLY. WHEREVER THIS HAS BEEN DONE, THE SPECIALTY OF ANESTHESIA IS IN A FLOURISHING CONDITION. THERE ARE MANY OTHER LARGE CITIES IN WHICH THERE ARE ENOUGH ANESTHETISTS TO PERFECT A LOCAL ORGANIZATION OF THE SPECIALTY TO THE ADVANTAGE OF ALL CONCERNED. IT IS TO BE HOPED THAT DURING 1920 THE ORGANIZATION OF THE SPECIALTY OF ANESTHESIA WILL GO FORWARD BY LEAPS AND BOUNDS. THIS MESSAGE IS MEANT FOR YOU! IT IS UP TO YOU TO SEE THAT YOUR COMMUNITY HAS THE BEST ANESTHETIC SERVICE OBTAINABLE AND THAT THERE ARE A SUFFICIENT NUMBER OF EXPERT ANESTHETISTS TO MEET ALL DEMANDS.

SOMNOFORM (ANESTHETIC MIXTURE) A NEGLECTED ANESTHETIC FOR ORAL SURGERY.*

Oel E. Lanphear, D.D.S.,
Kalamazoo, Mich.

When man found that the interfering pain, which hindered even the most skillful operation from even approximating good work, could be short-circuited, human life, liberty, and the pursuit of happiness were ushered into a new era, kaleidescopic in its limitless variations. The field of human progress was immeasurably broadened with the discovery of anesthetics suitable for subduing any of the endless varieties of pains to which human flesh is heir. Nitrous oxid and oxygen was projected on the stage of Human Endeavor in the alleviative field of Medicine to play the stellar role. It was cast in the hero's part and the studious thinking minds of today pay tribute to its ability, though they seek an anesthetic which can be given with less strain to the anesthetist, one that can be handled without a complicated machine, one with easy access to the source of supply. The most distinguished minds of all ages have endeavored to aid surgery to obtain perfect operative results in the smallest amount of time with the modicum of risk and discomfort both to patient and operator.

A limited number of men have mastered the technique of the evanescent or rapidly eliminated type of anesthetics. Few thoroughly understand nitrous oxid and oxygen and somnoform in their practical application and extreme value in the various fields of operative procedure under the multitudinous taxing psychic and physical conditions or seek to become past masters in their use.

The accursed apathy of the amateur anesthetist keeps him a tyro. He captures a single idea, puts it on a single track, or monorail and endeavors to operate without a gyroscope or stabilizer. These single track monorail anesthetists endeavor to create by word or otherwise oftentimes, (with their own lack of results as an example) many prejudices against the good work of nitrous oxide and oxygen and somnoform. Our many good earnest workers along this special line should be safeguarded against these amateurs in this most fruitful field of professional endeavor. I am a very strong advocate of the meritorious, tested agents, and they should be upheld by the anesthetist.

FIELD OF NERVE BLOCKING.

Local anesthesia produced by various chemical compounds of varying strength and osmotic tension are injected or projected into normal, inflamed, and pathological, human tissues with equal facility to say nothing of the psychological and physical condition of the patient. Many of the misguided amateurs are injecting unknown drugs into unknown spaces with befogged ideas of the anatomical structures upon which they are operating and erroneously terming the precedure nerve blocking. The saner minds are seeking a reaction. They are endeavoring to create a predominence of sane, scientific aseptic methods with due anatomical precision.

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*Read before the Section on Oral Surgery and Dentistry of the Interstate Association of Anesthetists, during the Fifth Annual Meeting, at Cincinnati, Sepember 15-17, 1919.

True nerve blocking by a skilled operator is to be indorsed. The nerve blocking anesthetist who inserts the needle into the deep tissues blocking the various nerve trunks, including the extraoral and intraoral methods, must thoroughly understand what he is doing. He must possess a thorough knowledge of the anatomy of the parts he is injecting and must understand the true meaning of asepsis, as well as possessing a thorough knowledge of the physiologic and toxic action of the agent employed. Careless, infective and defective blocking should be universally discouraged.

ADVANTAGES OF SOMNOFORM.

Close beside nitrous oxid and oxygen on our stage of Human Endeavor, we find somnoform in a star role of great worth. Somnoform most nearly approximates the ideal of the efficient anesthetic, simple equipment, ease of operation, speed of recovery of patient, uniformly good operative results. Somnoform is of great value in selective cases, for ease of operating, simplicity of machine and manipulation, comfort of patient, absence of venous swelling, speed of relaxation, speed of recovery, duration of narcosis and analgesia and transportation facilities for remote territories.

Somnoform as used at the present time is composed of ethyl chlorid, 83 per cent.; metyl chlorid, 16 per cent., and ethyl bromid, 1 per cent.

Quoting freely from DeFord, Henahan, Crile and others, anesthetic mixture is invaluable in facilitating the induction and obviating the long induction period of excitement for etherization. In operating on the upper air tract ethyl chlorid in combination is especially to be recommended because no asphyxia is developed. There is no sensation of suffocation, no cyanosis, no sterterous breathing, and if administered with percentage admixtures of atmospheric air, or oxygen, jactitation or spasm of the extremities of masseters rarely presents.

Rolland found in the combination of methyl chlorid, ethyl chlorid, and ethyl bromid an anesthetic which enters the circulation with practically the rapidity of oxygen, has an almost instantaneous effect on the nervous system and tissue cells, and on the cessation of its administration is equally as rapidly eliminated without causing any untoward complications.

PRELIMINARIES.

If you please the patient comes without a full meal, She is ushered into the dressing room where a trained nurse assists in the preparation, which is physical and psychological. One point is never allow her to be left to herself on account of mental forebodings.

Heneban holds that the aim is to have the patient as comfortable as possible and completely relaxed. Attention should be paid to this, for if the patient remains tense with the muscles contracted the tendency is to become more so, requiring a much deeper and more prolonged anesthesia. At this point it is well for the anesthetist to reassure the patient that all the nurse has promised of the virtues of the anesthetic is perfectly correct and that the outlook for the success of the operation is most promising. It is necessary also to come to an understanding with the patient regarding the respiration before inducing analgesia or anesthesia. Many persons carry a small volume of oxygen to the lungs at each inhalation and believe that their noses have little use for nasal breathing. Thus, little somnoform reaches the alveoli of the lungs. Observe carefully the volume of nasal breathing the patient does with the lips closed. The nose should be free and the patient convinced that he can breathe through the nose, especially when a nasal inhaler is used. While deep breathing is neither required nor desirable, moderate respiratory excursions are necessary for the proper induction and maintenance of anesthesia.

REPEATED ANESTHESIA.

During oral operations it may become necessary to repeat the anesthetic at the same sitting because of foreign bodies getting beyond the barriers erected to keep them from the throat or various other reasons. When necessary to repeat the anesthetic at the same sitting, sufficient time should elapse for the patient to fully recover from the effects of the first administration and at this time the mouth should be cleansed and care taken to control hemorrhage; if hemorrhage cannot be controlled by packing, the patient may be kept from smallowing blood by aspirating it mechanically. Continuous anesthesia is preferable to repeated administrations.

SIGNS OF ANESTHESIA.

The signs of somnoform anesthesia are very easily worked out by the anesthetist who gives the vapor deliberately and notes the progress until he develops an "anesthetic sense of intuition," which will enable him to adapt the technic of administration not only to the given patient, but also to all the exigencies of the operative procedure in hand. The stages are apparently parallel and are similar to ether. Often the patient breathes very irregularly until he loses consciousness, when the rhythmic breathing begins. The pupils dilate, do not react to light, and the eye lids pressed against the cornea fails to produce reaction and the eye balls become fixed.

METHOD OF ADMINISTRATION.

Absolute care must be exercised from the beginning of the anesthetic until the nasal mask has been removed that none of the valuable anesthetic—anesthetic that has not reached the lungs—is allowed to escape. Operators must have well adapted inhalers and handle the valve with precision. With the patient in readiness we turn to one side and quietly break a capsule of somnoform on the gauze of the modified DeFord Inhaler, thus there is only somnoform vapor in the bag. Then deftly apply the inhaler to the face with the valve closed and a second capsule in place ready for snapping. Let only enough vapor escape at the first and second inhalations to anesthetize the olfactory nerve ends.

Then proceed with larger amounts, catching a part of each expiration and partly opening the valve for each inhalation until the bag is nearly full. It may be inadvisable to catch all of each exhalation. By the tenth inspiration the patient's entire breathing should be into the bag and the patient nearly ready for the operation. Endeavor to so use your anesthetic that you get a gradual progression into anesthesia from the first, disregarding the quantity of somnoform consumed. If we feel that one capsule will accomplish all work, very well. If intuition tells us that we are getting too much carbon dioxid in an individual case we allow the patient to inhale from the bag and exhale into the atmosphere until the volume in the bag is lessened to any point we wish. Then we can break the reserve capsule. If conditions are right the anesthetist's assistant immediately inserts another tube. For prolonged anesthesia in oral operations we now exchange the face piece for the nasal piece and so regulate our valves that we get free breathing enough to keep the patient narcotized. We should discourage the method so many use of carrying the patient through the preliminary stages at so rapid a pace, that the anesthetist cannot note the important stages as the patient passes under. For this method often gives us a deeper narcosis than is required or necessary for the surgical operation at hand.

ANESTHETIZING CHILDREN.

Oftentimes, children present very trying cases when persuasion is of no avail. If the operating room with its many distracting influences is the last straw or for other reasons it may be advisable to start our anesthetic in the anesthetic room by holding a small cotton roll saturated with oil of orange and ethyl chlorid under the nose while we are visiting with them, then we can proceed with the anesthetic of choice. Parents may wish that we work by force if necessary. If so, we close the valve in a Starck Inhaler, break one capsule of somnoform upon the gauze with the bag half full of pure oxygen, place a second capsule in position and put the face piece over the whole face and open the valve one-half of the opening. Endeavor to catch the next exhalation and then give the contents of bag until struggling is lessened. Then adjust the valve to secure a stage of anesthesia easily recognizable and proceed deliberately.

A DeFord Inhaler is easily modified to meet the requirements of an office by having an adaptor just in front of the valve in such a position that it is very easy to interchange the nasal and mouth piece of a machine used in that office. Thus the rubber fittings are always in A1 condition.

AFTER-CARE.

As soon as the operation is over and the patient can be left to his own resources, the gauze and inhaler should be removed and discarded and the rubber bag and the various rubber attachments sterilized by dry heat and imersion in a bichlorid of mercury solution. Both sides of the bag should be thoroughly dried and powdered with soap-stone, all excess of the powder being then removed. Unless this is done the rubber bag and the air cushion will rapidly deteriorate. The metal parts of the appliance should be sterilized by boiling.

CONCLUSIONS.

In a busy office a somnoform anesthesia can be given and the operation performed successfully with less time, skill, and patience than is necessary for a successful nerve blocking with fewer after pains. Somnoform does not necessitate the anatomical knowledge demanded by local anesthesia. For minor operations, at the bed-side somnoform is less cumbersome and more easily managed especially if the surgeon is called upon to perform the double role of anesthetist and surgeon, that is, for short operations like lancing a boil, extracting a tooth. or the short dressing of a wound. The anesthetic period allowed the operator with the analgesia period following is sufficient.

HANSELMAN BLDG.

Abstracts

A Résumé of the International Current Literature of Anesthesia and Analgesia

Modified Open Ether Anesthesia. J. W. SILK. *British Medical Journal*, May 24, 1919.

Silk uses a mixture consisting of 1 dram of chloroform and 32 drams of ether. The patient should have a preliminary injection of morphin (1/6 to 1/4 grain) and atropin (1/100 to 1/60 grain). The face pad and mask is the same as for open ether, the mask being closely applied to the face and face pad from the very beginning. The liquid is used exactly as if it consisted of ether alone, the presence of the small quantity of chloroform being ignored. During induction the liquid is poured freely onto the mask just to the verge of resentment, but when consciousness and reflexes are abolished, it will suffice to reduce the supply to the dropping stage. The combination has given excellent results.

Shock Due to Mechanical Limitation of Blood Flow. J. ERLANGER and H. S. GASSER, St. Louis. *American Journal of Physiology*, Baltimore, July 1, 1919.

An examination was made by Erlanger and Gasser of the mechanical changes in the circulation occurring in shock as induced by procedures directly involving the abdominal viscera, that is to say, in the type of shock most commonly investigated. Another method of inducing shock was the so-called mechanical shock of Janeway and Jackson. These investigators studied the effect of temporary partial occlusion of the inferior vena cava. They found that properly graded temporary partial obstruction of the inferior vena cava above the liver or of the aorta beyond the origin of the left subclavian artery eventually results in the development of a condition closely resembling traumatic shock. They are convinced that the failure of the circulation after both manipulations is in part certainly due to the consequence of the sequestration of corpuscles in the capillaries and venules, and that if back pressure in the veins, such as is produced by caval obstruction, is a factor in the development of this state of affairs in the capillaries and veins, it is not an essential one. The fact that the vasomotor mechanism need not be involved (as for example in aortic obstruction) renders it unnecessary to invoke failure of a nervous venopressor mechanism to explain the fullness of the capillaries and venules. It can be explained on the basis either of the change in character of the blood stream, or respiratory and nutritional changes in the vessel walls or, and more probably, of both.

Circulatory Failure Due to Epinephrin. J. ERLANGER and H. S. GASSER, St. Louis. *American Journal of Physiology*, Baltimore, April 1, 1919.

The experiments reported by Erlanger and Gasser show that the injection of epinephrin for a period of from twenty to thirty minutes at such a rate as to maintain a high arterial pressure invariably constricts the arteries of both the somatic and the splanchnic areas. With large doses this constriction may be maximal and outlasts the injection period, it may be, for as long as two hours. This continued constriction is partly due to central action. After sufficiently large doses, the arterial pressure, barring occasional intercurrent phenomena, fall steadily and slowly until the animal dies. The jugular pressure, during or after large injections shows no constant alteration, at least not of a kind that indicates inefficiency of the heart. The heart may become irregular for a while and occasionally stop suddenly while the arterial pressure still is high. The respiration after large doses often is slowed and may suddenly or gradually fail. The portal pressure is increased, often markedly, during their injection, and may remain high subsequently; but not uncommonly it soon returns to the normal level. Evidence is presented indicating that accumulation of blood in the portal area as a result of the increased portal hepatic resistance is not in itself the cause of the failure of the circulation. The failure of the circulation is rather to be attributed to the extreme slowing of the blood flow throughout the body caused by the constricting action of the epinephrin of the arteries. It is concluded that the cause of the failure is the same as is operative after temporary partial obstruction of the vena cava or of the aorta.

Initiation of Wound Shock and Its Relation to Surgical Shock. E. M. COWELL. *Lancet*, London, July 26, 1919.

A number of points in connection with shock are emphasized by Cowell, such as the psychic aspect of the case and the loss of circulating fluid and body heat. He agrees with other observers that during operation in such cases, or where the anatomic interference contemplated is at all extensive, the surgeon should insist on gas and oxygen anesthesia either alone or combined with regional anesthesia. During the operation a falling pressure may be counteracted by giving from 500 or 1,000 c.c. of a 6 per cent. gum solution in physiologic solution of sodium chlorid. There is no evidence of any permanent benefit following the injection of any of the numerous drugs recommended from time to time.

Blood Regeneration and Bone Marrow Activity. Editorial, *Journal, American Medical Association*, August 16, 1919.

Although the length of life of the red cells of the blood is still unknown, there is no doubt that they undergo disintegration sooner or later. Sometimes their destruction is hastened by disease; sometimes the erythrocytes are lost to the body through hemorrhage. It becomes important at times, therefore, to learn to what extent reparative processes are taking place and whether red cells are being returned to the circulation. Microscopic examination of the blood during rapid regeneration of the erythrocytes reveals the presence of nucleated forms. Nucleated red cells have therefore been taken as "an inevitable feature of rapid blood degeneration." As Macleod[1] has pointed out, however, changes in the mode of red blood cell formation may be responsible for the nucleated forms.

Some time ago Warburg[2] demonstrated that whereas normal human blood consumes very little oxygen, blood such as that of birds, which contains nucleated erythrocytes, may evince a high oxygen absorption. Morawitz[3] has observed, however, that even in mammals blood obtained during the regeneration following an anemia may show an absorption of oxygen that cannot be accounted for by nucleated cells or by substances possibly dissolved in the plasma. The explanation seems now to have been furnished by Harrop[4] of the Medical Clinic at the Johns Hopkins Hospital, Baltimore. Starting with the assumption that the red cells in the blood which appear reticulated after certain methods of histologic staining are "youthful erythrocytes," Harrop has found that blood which contains abnormal numbers of them has an oxygen absorption proportional to the percentage of reticulated cells present. These two factors are interdependent; according to Harrop, both are due to the presence of abnormal numbers of youthful cells and both are probably rather accurate indicators of functional regeneration in the bone marrow and of the amount of blood regeneration. According to this latest American research, normal mature human erythrocytes have no oxygen consumption measurable by present methods. Furthermore, when it is measurably increased in the blood of individuals with anemia, the oxygen consumption has no direct relation to the severity of this symptom, and no constant relation to histologic abnormalities in the erythrocytes other than increases in the number of reticulated cells. A large proportion of all the nonnucleated red blood cells in the bone marrow are reticulated. Accordingly, the increase in the number of these forms, along with increase in the hemoglobin of the blood and a greater oxygen consumption thereby, is indicative of increased activity of the bone marrow.

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F. HOEFFER McMECHAN, A.M., M.D., *Editor*
Avon Lake, Ohio, U.S.A.

JANUARY. Editorials. 1920.

RECOGNITION GIVEN INDIANAPOLIS ANESTHETISTS AND THE SPECIALITY OF ANESTHESIA.

The recent appointment of Drs. A. E. Guedel and Charles Cabalzer as consultant anesthetists to the staff of the Indianapolis City Hospital is significant. It is the first public recognition of anesthesia as a specialty in that city. Commenting on this matter Dr. S. E. Earp, editor of the Indianapolis *Medical Journal* in the November issue, writes as follows:

"Time was, not so long ago, when every physician would clip a pair of tonsils in his office and think nothing of it. This was then a part of the general practice of medicine. But gradually the importance of proper technic in this operation, and the acquisition of greater skill in its performance by men who had given the matter special study, has forced the operation of tonsillectomy into a field of special practice. Likewise have other specialties been borne. The diagnostician of internal medicine, the tuberculosis man, the serologist, the urologist and many others are specialists because they are better trained and have acquired more skill in their particular fields than the general physician. There is so much more to be learned about every branch of medicine than there was to be learned twenty years ago, that it is impossible for any one man to gather and retain an adequate knowledge of it all. Therefore the specialist. To learn thoroughly any one branch of medicine at this date is a task to tax the best of us, and to do it well leaves but little time for work in other branches.

"Now comes anesthesia. Its advancement in late years has been rapid. Anesthetic organizations have been formed. Special attention is given to anesthesia in some of the better journals that we read. Some of our best men are working for the advancement of good anesthesia. There are men in Indianapolis who have given much time and attention to this work and as a result, our city today stands as one of the foremost centers of the United States in this branch of medicine.

Formerly, say twelve years ago, in this community the administration of the anesthetic was commonly left to anyone who happened to be near, whether a nurse, a medical student or the family doctor. No attention was paid to it from a scientific standpoint. One surgeon would demand chloroform for all cases; another would demand ether for everyone. There was no attempt to select an anesthetic agent or method, which was particularly suited to the individual patient or operation. Then, if a patient had a heart lesion or albuminuria that patient was a bad risk and was frequently denied the benefit of a surgical operation. If a patient died under an anesthetic his death was said to be due to a bad heart or to status lymphaticus and it was assumed that his time had come; that he would have died just the same under any other anesthetic circumstances. Today this is changing. It will be some time before it has completely changed. No specialty was born in a day. But it is changing.

The special anesthetist, the man who has given long time and study to the perfection of his knowledge of this work, is among us and his presence is being felt. The technician in the administration of any anesthetic agent, he who has mastered the mechanics of it, and has gone no further, cannot be called an anesthetist. The anesthetist of the future shall be a physical diagnostician and shall be able to assist the surgeon in the selection of the anesthetic to be used and the manner of its application. He shall be able to assume all responsibility for the anesthetic. It is not uncommon even now for the surgeon to leave the selection and the administration of the anesthetic entirely to the anesthetist. The surgeon wants none of the responsibility of this work, where he can crawl from under it. It is the anesthetist in the future who shall take the bad surgical risk and develop it into the safest possible one for the condition. Patients who are to be denied operation because of their inability to take a general anesthetic will be but few in number.

One of our anesthetists states that fully one-half of his work now comes from the patient, either direct or through the surgeon. This means that when there is to be an operation in any family, a careful and selected service in everything is desired. One of our surgeons who employs special anesthesia for most of his work states that in no case yet has the patient objected, after a brief explanation, to the extra expense of skilled anesthesia. Often now, the general practitioner over the state, when he refers a patient to the surgeons for operation, specifies the anesthetist to be employed in the case.

The day is passing when *anybody* can give the anesthetic. Recent advances in this work has made it a special practice worthy of our recognition. It is for the good of all medicine and surgery that this specialty be encouraged. Let us ask ourselves, "Were we to be operated upon who would give the anesthetic?" The question is at once answered. We want the skilled anesthetist for us and ours. Let us think of our patients with the same concern that we think of ourselves. Not only is it but fair to the patient: it is to our own advantage in every way.

In adding anesthesia to the staff of the Indianapolis City Hospital, are we leading the public, or are we supplying a public demand? In either case it is a step forward for medicine and surgery in our community."

THE QUESTION OF THE ANESTHETIST IN THE SURGICAL BARRAGE.

Speaking before the Joint Session of the Interstate Anesthetists and the American Association of Obstetricians and Gynecologists at Cincinnati, O., September 15, 1919, Dr. Charles W. Moots, of Toledo, O., emphasized anew that the professional anesthetist is the most important factor in the Surgical Barrage thrown about patients coming to operation for their protection. While Dr. Moots goes into details in his paper on this subject, published in this issue of The Supplement, the editor deems Dr. Moots such an authority in the matter of professional anesthesia that he is reprinting his pertinent remarks, editorially, so that their force and influence will have reiterated effect. Dr. Moots says:

"We have considered all the arguments ever offered in favor of the non-professional anesthetist, and in times past were inclined to admit that in some of them there existed a partial truth, but with our profession home from the war and such goodly percentage ready to devote their lives to the study and the practice of anesthesia, there now exists no reason for any surgeon, who is unselfishly devoted to raising the standard of hospitals and surgery, to encourage in any way non-professional anesthesia. All pro-arguments when well disected fade away and a new light upon the screen shows the real cause of the blustering, *viz.*: The surgeon in the big clinics was not happy in the thought of a fair fee going individually to a professional anesthetist and the surgeon in the smaller cities hoped to encourage the family physician to send more cases by having him give the anesthetic. And it is quite probable that the surgeon has some times used the matter of anesthesia as an excuse to give the practitioner a fee somewhat larger than the skilled anesthetist would have charged the patient.

"The question of the advisibility of nurses administering anesthetics has recently been brought up before us. It is our conclusion after what we feel to be an impartial study of the subject that while some nurses may be taught to administer the safer agents in uncomplicated cases in a manner highly satisfactory to the operator, yet the principle is fundamentally wrong for reasons so numerous that we hesitate to embody them in this paper. We still maintain that the administration of a general anesthetic is the giving of the most powerful and dangerous drug at the most perilous time of the patient's life. During any major operation the anesthetist may be called upon to make one or several new diagnoses and prognoses, and this certainly constitutes the practice of medicine and even demands unusual skill.

"Few surgeons know much about the subject of anesthesia because the subject has not been properly taught in our colleges and hospitals. Our hopes for this subject, therefore, lie in the encouragement we give the specialty of professional anesthetics. . . . . .

"It was with extreme regret upon our part, that upon our return from the war-ridden countries, we found the Legislature of our own great state, Ohio, legalizing non-professional anesthesia. Already we hear the jeers of the non-medical cults concerning the all too apparent insincerity of some of our leaders regarding their desire to really raise the standard of the medical profession."

In this connection it is interesting to know that the Chiropractors in Ohio are using this inconsistency of the medical profession to further their own legislative aims. Why deny Chiropractors anything when lay anesthetists are legalized to trifle with life in its most perilous moments.

It is doubly interesting to know that in the great and glorious Commonwealth of Ohio, from the statistics of Drs. Salzer and Stewart that coroners', hospital and surgeons' figures all show a mortality rate of at least one death in every five hundred anesthesias, irrespective of the agent employed. It is to be hoped that coroners will presently demand an explanation for this state of affairs. It is no wonder with this prospect in view that the Southern California Association of Anesthetists is trying to protect the people of California from exploited lay anesthesia and anesthetists now being foisted on the country by nurse anesthetist mills in New York, Cleveland and Rochester.

The Editor also hopes that those who fostered the campaign against *fee splitting* will presently get busy in dealing with those who are charging professional anesthetic rates for camouflaged services and are putting the profits in their pockets. If the profession-at-large does not deal with these profiteers drastically some one else presently will.

Considerable interest is being shown on the Pacific Coast with regard to ridding the profession of lay practioners and technicians. In this connection the following resolution adopted unanimously by the Los Angeles County Medical Association, on October 16, 1919, is significant:

"Resolved, That the Los Angeles Medical Association go on record as in favor of the limitation of the practice of anesthesia to regularly licensed physicians and surgeons."—McM.

THE NATIONAL ANESTHESIA RESEARCH SOCIETY.

After several meetings to discuss ways and means of advancing the progress of anesthesia not only for the welfare of the public, but also of surgery and the specialty, a number of the forward-looking manufacturers of anesthetic agents and apparatus have formed a business organization with a limited appropriation for 1920 to establish the National Anesthesia Research Society in the hope that their efforts may eventually be broadened into an Anesthesia Foundation.

For the present all efforts will be directed toward the stimulation of research in anesthesia and it is confidently expected that those who are doing such research work will lend the prestige of their names to the roster of the Research Committee of which the Editor of the Supplement has accepted the Chairmanship and Dr. W. I. Jones, of Columbus, O., the Secretaryship.

A very broad program for ultimate accomplishment has been made a part of the By-Laws of the new organization and the details of this program will be announced in the next issue.

A canvass is now being made to interest research workers in becoming members of the Research Committee. This membership entails no responsibility other than the making of research results available for the scientific educational campaign of the Society.—McM.

Society Proceedings

Membership in a society devoted to your specialty is an essential to success.

INTERSTATE ASSOCIATION OF ANESTHETISTS. —FIFTH ANNUAL MEETING.

The Interstate Association of Anesthetists held its Fifth Annual Meeting in Cincinnati, Ohio, at the Hotel Gibson, September 15-16, 1919.

After the address of welcome by Dr. C. T. Souther, of Cincinnati, Dr. E. I. McKesson presented the gavel to Dr. J. J. Buetter, of Syracuse, N. Y., chairman-elect, who then presided.

During the executive session the minutes of the previous meeting and the treasurer's report were accepted as read. The following officers and members of the ex-executive committee were elected for the 1920 meeting:

W. I. Jones, D.D.S., Columbus, O., Chairman; Samuel Johnston, M.D., Toronto, Canada, Vice-Chairman; F. H. McMechan, M.D., Avon Lake, O., Secretary-Treasurer; A. S. McCormick, M.D., Akron; John H. Evans, M.D., Buffalo; Marie Kast, M.D., Indianapolis; A. E. Smith, D.D.S., Chicago; Ralph M. Waters, M.D., Sioux City, and Roy S. Hopkinson, D.D.S., Milwaukee.

The secretary-treasurer was voted an appropriation of $250 for his services during the past year. The place of meeting, as usual, for the 1920 meeting was left to the discretion of the officers and executive committee.

The following members were elected: Drs. Myra E. Babcock, Detroit; W. D. Braun, Buffalo; A. D. Caldwell, Platesmouth, Neb.; Cline M. Chipman, Washington, D. C.; Morris H. Clark, Kansas City; Rozelle M. Cope, London, O.; S. J. Coulter, Toledo, O.; F. E. Coultrap, Toledo, O.; P. L. Crume, Dayton, O.; J. C. G. Fitzhugh, McKeesport, Pa.; James A. Flanagan, Shenandoah, Pa.; T. L. Gregg, Dayton, O.; Frances E. Haines, Chicago; Walter H. Hartung, Toledo, O.; T. F. Higgins, Toledo, O.; W. J. Hodson, Dallas, Tex.; F. B. Jones, Cleveland; G. W. Kiel, Columbus, O.; C. LaRocque, Montreal; D. A. Leahy, Cincinnati; Al. J. Lewis, Dayton, O.; A. J. Marlewski, Cleveland; Anna W. Marquis, Norwich, N. Y.; R. C. Matteson, Sioux City, Ia.; John Morgan, Rochester, N. Y.; H. C. Neale, Pittsburgh; F. M. Ogden, Cincinnati; H. E. Packard, Sioux City, Ia.; E. A. Peebles, Wilmington, O.; J. G. Poe, Dallas, Tex.; C. E. Price, Toledo, O.; C. J. Reynolds, Buffalo, N. Y.; C. E. Richmond, Colorado Springs, Col.; S. D. Ruggles, Portsmouth, O.; K. I. Sanes, Pittsburgh; C. R. Singleton, Clarksburg, W. Va.; Edyth Smith, Cincinnati; F. J. Sullivan, Columbus, O.; Joseph S. Sullivan, Toledo, O.; R. W. Weaver, McKeesport, Pa., and C. W. Wilkinson, Sioux City, Ia.

During the scientific session the following papers were presented:

Reaction of the Tubercular to Ether Therapy, Ernst Zueblin, M.D., Cincinnati;

The Blood Picture in Experimental Ether Anesthesia, J. B. Rogers, M.D., Cincinnati;

Some Results from Anesthesia Experiments on Animals, W. I. Jones, D.D.S., and Clayton McPeek, M.D., Columbus, O.;

The Third Stage of Ether—A Subclassification, Arthur E. Guedel, M.D., Indianapolis;

Selective Anesthesia, Morris H. Clark, M.D., Kansas City, Mo.;

Draw-Over Ether Vapor Anesthesia; Its Advantages and Apparatus for Use, Ben Morgan, M.D., Chicago;

General Anesthetics for Intraoral Operations, C. H. Burmeister, D.D.S., Cincinnati;

Nitrous Oxide-Oxygen Anesthesia for Oral Surgery and Dentistry, J. P. Henahan, D.D.S., Cleveland;

Somnoform, a Neglected Anesthetic for Oral Surgery, Oel E. Lanphear, D.D.S., Kalamazoo, Mich.;

Possibilities and Limitations of Local Anesthesia for Oral Surgery, Bion R. East, D.D.S., Detroit;

Postoperative Lung Complications with Special Reference to Oral Procedures, Isabella C. Herb, M.D., Chicago;

The Advantages of General Over Local Anesthesia in Tonsillectomy, Harvey M. Becker, M.D., Sunbury, Pa.;

Can Anesthesia Be Made a Specialty?, Cline N. Chipman, M.D., Washington, D. C.;

What Can Be Accomplished by Local Organization?, A. W. Hartung, M.D., Toledo, O.;

The Question of Fees and Advertising, C. C. McLean, M.D., Dayton, O.;

The Legal Status of the Non-Medical Anesthetist, Mr. Lewis, Counsel N. Y. State Medical Society.

The Interstate was accorded a Joint Session by the American Association of Obstetricians and Gynecologists. During this session the following papers were presented and discussed:

Safety Factors in the Team-Work of Operator and Anesthetist, John J. Buettner, M.D., Syracuse, N. Y.;

Surgical Barrage, Chas. W. Moots, M.D., and E. I. McKesson, M.D., Toledo, O.;

Nitrous Oxide-Oxygen Anesthesia in Labor, Charles E. Turner, M.D., Columbus, O.;

Some Adjuncts Which Promote Efficiency in the Use of Local Anesthesia in Major Surgery, R. E. Farr, M.D., Minneapolis, Minn.;

Post-Operative Analgesia, Bertha Van Hoosen, M.D., Chicago.

The Annual Dinner was served by the Hotel Gibson in the Cascade Room on the first evening of the meeting. The visiting ladies were entertained at several theater parties.

Quarterly Index

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Anesthetists on the Hospital Staff. Isabella C. Herb, Chicago. Modern Hospital, August, 1919.

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Blood Pressures, Clinical Study in Preoperative and Postoperative, and Their Relation to Renal Function and in Shock and Hemorrhage. J. O. Polak, Brooklyn. American Journal of Obstetrics and New York State Journal of Medicine, August, 1919.

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Nitrous Oxid-Oxygen Anesthesia. A. G. Brenizer, Charlotte, N. C. Southern Medical Journal, October, 1919.

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METHODS OF EXAMINATION IN DISEASES OF THE RECTUM AND SIGMOID COLON.

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Through the courtesy of the editor of this JOURNAL, I am asked to write an article "for readers many of whom are general practitioners." The great majority of general practitioners have been afforded opportunities of clinical instruction in nearly every department of medicine and surgery with the notable exception of that large class of diseases common to the anus, rectum, and pelvic colon. It is not remarkable, therefore, that many otherwise skillful practitioners imagine considerable difficulties are associated with the diagnosis of these cases, and that, consequently, the treatment adopted by them is, as a rule, almost entirely perfunctory, haphazard, and unsatisfactory. From personal experience in post-graduate teaching, I have come to the conclusion that most mistakes are due to the practitioner's failure to make a routine examination of his rectal patients, rather than to his lack of knowledge. For this reason I shall emphasize the physical examination.

I would not underestimate the importance of a careful history, which is frequently very suggestive of the lesions which should be sought for. Such symptoms as pain, hemorrhage, protrusions, discharges, constipation, diarrhea, tenesmus, and loss of weight are characteristic of rectal disorders, and should be particularly inquired about. Still, too much weight should not be attached to the symptoms even as related by well-informed people, for they are frequently so garbled with miscellaneous facts that any physician who attempts to prescribe without a rectal examination will more often than otherwise have reason to regret it.

For the local examination the usual office table or chair that allows the top to be raised or lowered, and tilted from side to side, is very convenient. If it is desired to make the examination at the patient's house, any table, such as is procurable in the ordinary household, will answer for a complete exploration of the rectum and sigmoid. The right or left lateral semi-prone position is the easiest position in which to conduct the preliminary examination. When the buttocks are separated, the whole perianal region comes readily into view.

INSPECTION:—The perianal skin should be inspected to ascertain whether its appearance is normal or abnormal. Among the external pathologic conditions which can be established by inspection alone may be mentioned ulceration, new growths—benign or malignant—external and thrombotic hemorrhoids, eczema, the blanched and sodden appearance of the skin in pruritus ani, and the external openings of fistulæ.

The next step is to palpate all about the anus with the index finger, noting among other things the condition of the external sphincter, whether it is in a state of tonic contraction or relaxed; also any point of tenderness that may be suggestive of the location of some lesion in the anal canal, such as a concealed ulcer. In this way the indurations marking the burrowings of a fistula should be made out rather than by inflicting unnecessary pain by exploring them with probes. Indurations indicative of a deep-seated abscess can frequently be made out by palpation.

Finally, before proceeding to the internal digital examination, the anal margin should be separated, at the same time requesting the patient to strain down. This measure will relax the sphincters, evert the anal orifice, and bring into view such conditions as internal hemorrhoids and anal fissures.

DIGITAL EXAMINATION:—When undertaking an examination of the rectum, it should always be borne in mind that all manipulations, whether digital or instrumental, should be conducted in as gentle a manner as possible. Introducing the finger roughly or hastily into the rectum without previous warning, or before requesting the patient to strain down, is responsible for much of the great dread that many persons have of rectal examinations.

The region about the anus having been inspected and palpated as described, the index finger is smeared with a stiff lubricant and gently inserted with a rotary motion into the rectum, the patient at the same time being requested to strain down as in the act of defecation. The finger should be passed only as far as the first phalanx, to begin with, as many of the diseases of the rectum are located within an inch of the anal orifice. The resistance of both sphincters should now be observed, and the internal opening of fistulæ, ulcerations, fissures, etc., can readily be detected at this level. The examination, however, should not be completed until the finger has been passed to its full extent in search of new growths, strictures, invaginations, etc., and the facilities for palpating the uterus, prostate, and neighboring structures should be utilized as far as possible.

When the finger is being withdrawn, the condition of the levator ani may be investigated by asking the patient to voluntarily contract the sphincters, and as they both receive their nerve supply from the fourth sacral, they will, therefore, be contacted simultaneously. An exceptionally tight grip on the finger, with marked tenderness, should suggest a fissure, concealed ulcer, or the incipient formation of a perirectal abscess. One cannot by a mere digital examination explore the rectum much above that portion which is uncovered with peritoneum, except anteriorly. However, large growths and fecal impactions of the sigmoid frequently descend, or can be depressed by bimanual examinations, so that they can be felt through the rectal wall, but, as a rule, three to four inches is about as high as one can reach with the finger.

Specula:—Most of the specula that are being offered for sale were made before the introduction of the proctoscope, and were the only means of visual exploration of the rectum up to that time. Since then, the round tubes of Kelly, and later modifications that have come into use, leave nothing to be desired for an examination of the rectum above the sphincters. The older conical bivalves, some fenestrated, others with wire blades or a removable one, can now be looked upon only as exquisite instruments of torture, except when employed under general anesthesia.

One must, however, have some sort of a speculum, and the one I always use is a round tube with an obturator that is withdrawn after the instrument has been inserted. It is known as the Otis speculum. A section has been taken out of the distal end, a half-inch wide and about an inch and a half in length. Its edges are smooth, and the lower part of the tube supports the mucous membrane anterior to the part being examined, thus affording a good view. It is a useful instrument for the non-operative treatment of internal hemorrhoids, removing hypertophied anal papillæ (often the cause of rectal neurosis, pruritis, etc.), as well as for exploring the crypts of Morgagni for disease or foreign bodies, and in making applications to ulcers of the anal canal.

Another instrument that I would not be without is a rectal retractor, patterned after the Sims' vaginal, but made to conform with a greater nicety to the contour of the sphincters, the tip fitting snugly in the hollow of the sacrum. It can be inserted without causing pain by placing the palmar surface of the index finger in the concave surface of the blade. This retractor is particularly serviceable for incising submucous abscesses and fistulæ of this variety. It is also an excellent instrument to have at hand in case of a post-operative rectal hemorrhage.

Abdominal Examination:—Much useful information is often found by percussion and palpation of the abdomen, particularly in the class of patients with complaints of such a nature as to prompt one to make a sigmoidoscopic examination. The colon should be palpated throughout its entire course from the cecum to the rectum. Even when the patient may truthfully assert that the bowels are acting with seeming regularity, it is not an uncommon occurrence to find the sigmoid flexure and rectum overfilled with feces, and the colon, above this point, much distended with feces or gas. The abdominal examination should include as well a search for any abnormalities, whether anatomical or pathological, not only of the colon, but also of the liver, gall-bladder, stomach, spleen, pancreas, appendix and kidneys.

Procto-Sigmoidoscopes:—In order to examine and treat the upper rectum and sigmoid, the general practitioner can get along very well in the management of the great majority of cases with two Kelly tubes,—one six and the other ten inches in length. The Kelly instruments are intended to be illuminated by reflected light with a long-focused head mirror.

The advantages of the electric sigmoidoscope over the head mirror and stationary light is considerable, when the longer instruments are used. It was on this account that the original Kelly instrument was modified by attaching a small electric lamp at the distal end of the tube, which affords better illumination than is possible with reflected light. Another feature which was added to some of these electrically lighted proctoscopes was that of closing the proximal end of the tube with a glass cap, so that the rectum can be inflated with air, forced in with a hand bulb.

There are eight or ten varieties of these procto-sigmoidoscopes, very similar in many respects, but each having some modification which seemed of especial importance to the designer.

Preparation of the Patient for Sigmoidoscopy:—All clothing tending to prevent abdominal relaxation should first be removed. When the rectum is found to contain feces, a small enema of boric acid solution, not exceeding eight ounces, will quickly empty not only the rectum, but frequently the sigmoid as well, thus facilitating an adequate examination, but, in atonic conditions of the large intestine, it will be found necessary to ask the patient to return later so that he may be prepared for sigmoidoscopy as follows: On the morning preceding the day set for examination, three to six drams of magnesium sulphate or a suitable dose of Hunyadi or some other aperient saline mineral water should be taken. Three hours before coming to the office, the bowel should be further cleansed with a large enema of normal salt solution, to be followed two hours later by an injection of half a pint of clear water containing a dram of glycerine. This last enema should never exceed the amount stipulated, for if more is used, some may remain in the sigmoid and cause much annoyance by being discharged during the examination or treatment.

Caution should be exercised in passing the proctoscope, especially when there is an active ulcerative condition of the bowel. Several cases have been reported in which perforation has taken place, in most instances caused by using undue force or over-inflation of the gut with the pneumatic hand bulb. Personally, I have almost entirely discarded the hand bulb, for by getting the patient in a good proctoscopic position, it is rarely needed. Its use is often distressing, and in ulcerative conditions it must be regarded as a dangerous practice. In some cases, an invagination, acute flexure, angulation, or narrowing of the caliber of the gut will not be straightened out by air insufflation.

Air will pass through such places, causing considerable distension above, without one's being aware of it, unless the patient complains of abdominal pain. It is in such cases as these, when there is ulceration above, that the greatest danger lies.

If the onward progress of the instrument is impeded, it is better to withdraw it slightly, get the direction of the gut, and then reinsert the obturator, which will allow the tube to be passed with less inconvenience to the patient. This maneuver can be repeated until the tube has been passed as far as desired.

Before introducing the tube, the patient should be made as comfortable as possible in the genu-pectoral position. If for some reason this posture is impossible because of an ankylosed or amputated lower extremity or great discomfort in assuming this position, the lateral semi-prone, with the knees well drawn up on the abdomen, may be substituted. In fact, this latter position is favored by some proctologists for esthetic reasons, claiming that it is much less unpleasant for women and hypersensitive individuals, but I believe that the genu-pectoral position should nearly always be the one preferred because of the greater ease with which the instrument is passed and the lessening of the degree of discomfort to the patient.

The passage of any instrument into the rectum is rendered less difficult by first inserting the finger past the sphincters. This procedure dilates and lubricates the anal canal, as well as affording the surgeon an opportunity for ascertaining the exact direction in which the instrument should be guided before the obturator is withdrawn. The sigmoidoscope, warmed and smeared with vaseline, should be pressed firmly over the anal orifice, the patient at the same time being requested to strain down, thus relaxing the sphincters. A stead, firm pressure in a downward and forward direction should be made on the handle of the instrument until it has passed the anal canal. After this portion has been passed, the handle should first be gradually lowered and pushed forward until the end of the instrument has reached the middle portion of the sacrum. At this point the obturator should be withdrawn, which will allow the bowel to become distended with air so that the tube can be passed onward by sight. The instrument is then gradually raised, allowing it to be gently pushed onward to the promontory of the sacrum, where considerable resistance to the onward progress of the instrument is met. A great deal of difficulty is experienced by the beginner at this point in passing the instrument into the sigmoid, because of a well-developed fold of mucous membrane, known as O'Beirne's sphincter, situated at the junction of the rectum and sigmoid. This valve-like sphincter frequently makes the rectum appear to end abruptly in a blind pocket. If careful search now be made, the valve will be located in close apposition to the opposite wall of the gut. It can then be effaced with the end of the instrument, so as not to retard its further progress into the sigmoid flexure.

The great majority of sigmoidoscopic examinations are conducted without the use of general anesthesia. Occasionally, however, it is desirable, when there are painful affections about the anus, or the patient is apprehensive of being hurt. It should always be borne in mind when employing ether that there is more danger of injury to the intestine, as we do not have the patient's sensations to warn us when making too much pressure or distension.

We have, therefore, in the procto-sigmoidoscope, an instrument which has been demonstrated to be of great practical utility, not only for the diagnosis of new growths—benign and malignant—but also in the treatment of many conditions which are dependent on catarrhal inflammations of the rectum and pelvic colon, such as hypertrophic and atrophic catarrh, traumatic, tubercular, and specific ulcerations, and so on.

With the lesions brought plainly into view and easy of reach, direct topical applications to the diseased tissues may be made, which will prove more effective than the more commonly employed medicated enemata and suppositories.

FECAL INCONTINENCE.

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Chicago.

Fecal incontinence may result from injury to the lumbar spine, from disease within the rectum or from traumatic impairment of the contractile power of the sphincter. The loss of fecal control may be complete or only partial. In transverse myelitis it may be mistaken by the patient for diarrhea. A temporary partial incontinence sometimes is associated with the severe prostration of acute or chronic diseases such as typhoid fever, cholera, pneumonia and tuberculosis. Incontinence in any of these conditions may be followed by impaction of the rectum because of the loss of tactile sensation of the rectum and the lessened secretion of mucus to lubricate the fecal mass. Incontinence of feces associated with incontenence of urine is a symptom of Jacksonian epilepsy.

The most frequent traumatic causes of incontinence of feces are operation for rectal fistula and hemorrhoids, and rupture of the recto-vaginal septum by childbirth. Tuttle says, "This condition has become a nightmare to the profession and a stumbling block to every layman suffering from fistula. It is the shibboleth of the charlatan by which he frightens the sufferer away from the regular surgeon and induces him to be content with palliative treatment rather than submit to an operation." Incontinence does not occur anything like as frequently as is generally supposed. It is quite unusual to have more than temporary incontinence unless extensive burrowings or multiple fistulous openings exist. Incontinence may follow dilatation of the sphincter but only if there is some underlying spinal or nerve disease. Oblique, irregular or jagged incision of the sphincter, even though single, may result in such a vicious union of muscle ends that incontinence results. Transverse cutting of the sphincter is not likely to produce incontinence. The integrity of both sphincters is absolutely necessary for the voluntary control of the anus. If the muscle is cut squarely across and the ends united again so as not to materially increase the muscle length there will be good control. But if a wide band of scar intervenes between the severed sphincter ends the muscle will not sufficiently contract to thoroughly close the anus (figure 1). Oblique incision of the sphincter allows the divided ends to slide upon one another until the internal fibers of one end unites with only the external fibers of the other end thus very much lengthening the muscle, and frequently followed by incontinence. When the sinus of a fistula passes through the body of the external sphincter muscle an incision severs only the lower fibers. These may be left to close by granulations. But if the entire muscle is divided and the wound edges retract there is always some incontinence. If the sphincter is cut more than once incontinence is almost sure to occur.

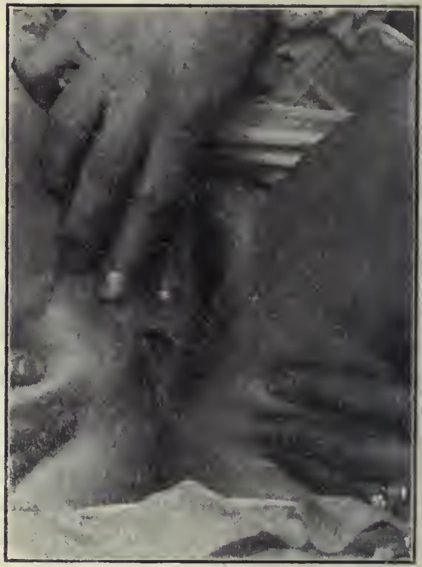

Fig. 1—Showing dimple on either side of the anus where the severed ends of the sphincter muscle are to be found.

Sometimes following childbirth the perineum is restored but the anal sphincter is not united and incontinence results.

Symptoms.—Four to six weeks following severance of the sphincter it retracts although to a variable degree. Sometimes the muscle ends are still bound together and the tear only enlarges the circle slightly. In other instances the ends are widely separated and the muscle which is thick and short makes but a shallow arc behind the anus, with a deep dimple in the skin of the posterior raphé behind the location of the muscle. A smooth glazed depression of the skin or sometimes puckered pits mark the location of the ends of the sphincter. Thus the ability of the patient to retain feces is not an index of the depth of the rent in the muscle but rather of the extent of separation of the ends of the fibers. If the cicatrix binds the ends firmly together an efficient sphincter may still obtain. In the less fortunate individuals who apply for help this approximation is what we hope to attain by a plastic operation. The individual can usually retain formed feces satisfactorily but as soon as the discharges are at all liquid incontinence occurs. The result is that the patient limits his diet and uses drugs to maintain a degree of constipation which soon interferes with proper alimentation. Intestinal gases also escape and the unpleasant odor forces him from society and he soon becomes melancholy, thus adding another chain of complaints. If the mucosa prolapses a rectal tenesmus appears. Many of these patients develop a nervous diarrhea excited by the least rumbling of intestinal gases. The whole complex of symptoms tends to reduce the patient's physical well-being.

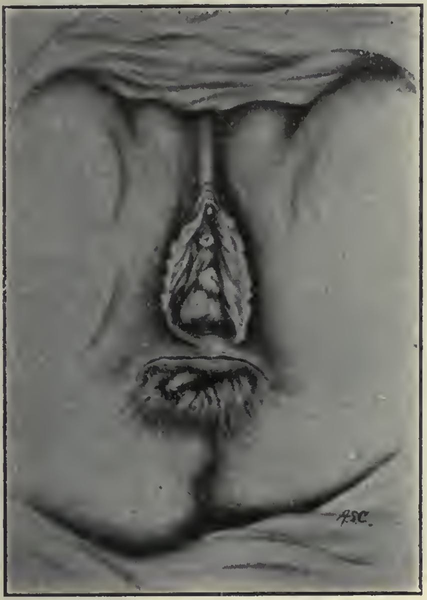

Fig. 2—Line of incision to expose the operative field.

Treatment.—When the incontinence is only partial much relief is obtained with galvanic electricity, hot formentations and a careful regulation of diet. These should be tried before resorting to operative interference.

Operative Treatment.—Any plastic operation to be successful must be based on a knowledge of anatomy and function of the structures involved. The only rational aim of the surgeon in all such plastic work should be to restore the damaged parts to as near as possible their normal functional state, or in other words to follow nature's plan in the reformatian of the region. The relief of incontinence depends upon our ability to reunite the severed ends of the sphincter. Our success also depends upon the amount of muscle destroyed in the original operation or the subsequent sloughing of tissues and also upon the length of time elapsed since the damage was sustained. The muscle cut, and therefore unused, will atrophy and in time is useless if reunited, or it may have degenerated so much that it cannot be found. If much tissue has been destroyed the muscle fibers may be too short to be brought together. Usually, however, the fibers because of their imperfect position are too long to act and the indicated operation then is to shorten and brings the ends into normal position.

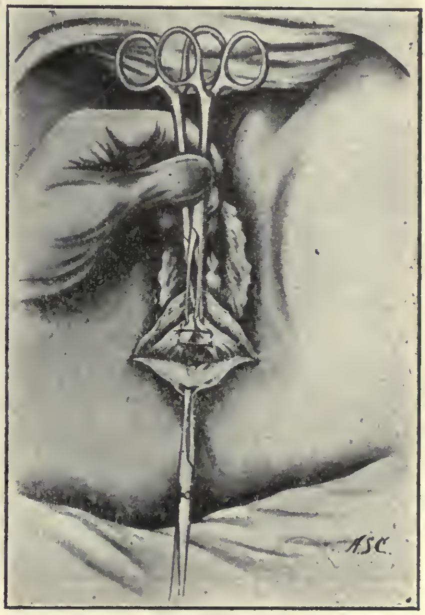

Fig. 3—Exposed sphincter muscle ends have been approximated.

If the patient suffers with a diarrhea the colon will need a thorough cleaning out a few hours before operation. It is well to give a light purge twenty-four hours before the time set for operation so that its effect will be spent during the next twelve hours. Three hours before operation the colon is to be freed of all fecal matter by an enema given until it returns clear.

Case Report, A-36—Had what appears from the history to have been a suppurating Bartholin gland, although she says she "had two abscesses of the rectum, one of which opened spontaneously and the other was lanced." Fistulae resulted which were operated upon again in February, (18 months and 24 months ago respectively). Since the last operation there has been a protrusion at the anus but no bleeding. There is a sense of pressure in the pelvis and an almost constant desire to go to stool.

There is a narrow scar in the left anterior part of the anus extending outward and anteriorly about an inch. Also on the right side of the anus there is an irregular scar about one-half an inch wide and extending laterally about an inch. The anal mucosa protrudes and the anus gapes open about one-half inch.

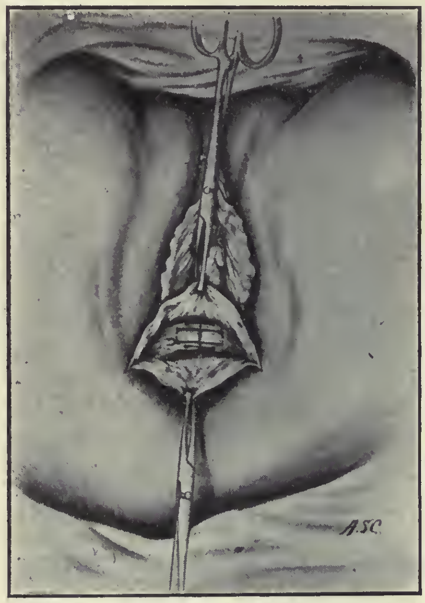

Fig. 4—Sphincter muscle has been repaired.

On digital examination the contractility of the sphincter is found missing. With one finger within the rectum and the thumb palpating the anal rim the sphincter can be felt around the posterior half of the anus and is found to contract under the patient's voluntary effort.

Fig. 1 is a photograph of the patient when she came for examination. It will be seen that the radial folds of the skin extend outward posteriorly from the anus only. The anal mucosa prolapses on the anterior and right walls. The relaxation of the perineum allows the vaginal wall to prolapse. This patient has never borne a child.

Operation—The patient was placed in the dorsal position and a horseshoe-shaped incision was made through the skin around the anterior commissure of the anus beginning at or back of the dimple marking the sphincter end on her right side and extending past the sphincteric dimple on the left side (figure 2); a flap of tissue was dissected out and the ends of the sphincter muscle exposed, being careful to remove only so much of the muscle as was absolutely necessary because that muscle was already very short. (In a case of long standing the sphincter ends may be indistinct. If so, the muscle may be pinched or pulled upon to excite contraction and the ends thereby discovered, or the muscle may be rolled between the operator's thumb and finger. If the sphincter ends have been widely separated an extensive exposure of the tissues will be necessary.) In this patient the sphincter had been cut in two places and the whole anterior portion of the muscle had degenerated.

The sphincter ends, having been found, were now freed from the surrounding tissues and drawn out with clamps (figure 3) until they could be well approximated, and were fastened together with a mattress suture of No. 1 chromicized catgut (figure 4). A single suture was also fastened through the muscle at its sides to approximate a wide surface. A tension suture of paraffined silk (figure 5) was now passed through the skin behind the ends of the incision transfixing the sphincter muscle on that side, passed up through the perineal body and then out, transfixing the muscle on the opposite side of the wound. As this suture is fastened it reinforces the sutures in the divided muscle ends and prevents tension by the involuntary contraction of the sphincter.

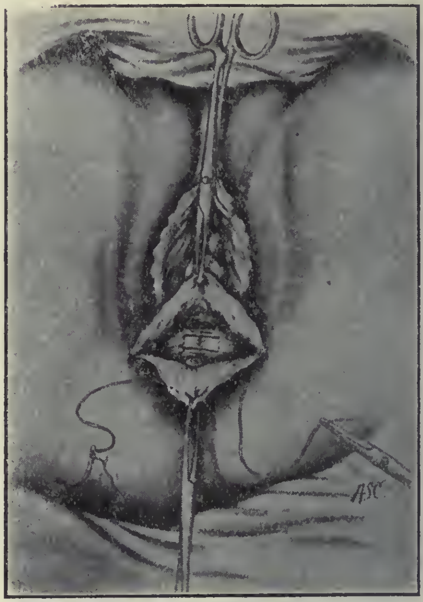

Fig. 5—Deep tension suture in place.

After all oozing was checked the skin sutures of fine paraffined silk were placed to close the wound and then the tension suture was tied tight enough over a gauze pad to relieve tension on the buried sutures approximating the sphincter ends (figure 6). The buttocks were strapped together with a broad band of adhesive plaster to prevent accidental traction on the wound. Further protection was assured by binding the patient's knees together for the first few hours until she had regained control of herself after the anesthetic.

When the operation is well performed and is successful in bringing direct opposition of the muscle ends, the skin folds radiate from the anus and form a complete star all around it just as they did before the sphincter was injured.

The patient's bowels were confined eight days by allowing as food only egg albumen, two tablespoonfuls in water every three hours. On the eighth day the patient received an enema of water, six ounces and mineral oil three ounces. This enema was repeated daily thereafter until all hard fecal masses in the colon were removed. No laxative was given. Our patient turned on her side or face to urinate and sometimes it is best to have the patient lie on her side when the bowels move to avoid straining. When albumen alone is given there are very few scybala and the evacuation is without difficulty or danger.

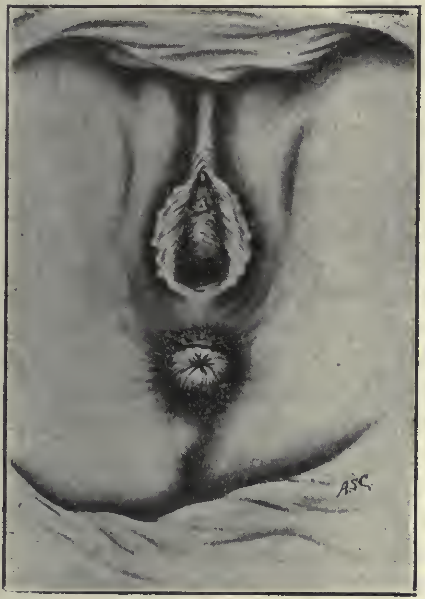

Fig. 6—Wound closed. The gauze pad under the tension suture is not shown.

In every case the wound must be carefully examined daily to be sure no infection or abscess is developing. Should an abscess occur it must be incised early and drained in such a direction, if possible, that the united ends of the sphincter will not be injured.

The patient should remain in bed for two weeks after the operation and for four weeks more should go about with care, avoiding hard work or lifting.

If the sphincter has been divided in more than one place and the separated section still has contractile power the operation should be performed in several steps, repairing only one injury at each sitting. The second operation may be attempted a month after the first.

Narrowing of the anal outlet will greatly benefit the patient when the muscle function cannot be restored by plastic operation. In such a case a buried kangaroo tendon is passed around the anus at the level of the upper border of the external sphincter and tied firmly upon the index finger introduced into the anus. If these procedures fail or cannot be used, a left-sided colostomy with an abdominal anus should be advised.

30 North Michigan Avenue.

NOTES ON RECTAL SURGERY.

1. Fecal Control After Amputation of the Rectum and Colostomy.
2. A Helpful Expedient in Fistula Operations.
3. A Technic of Hemorrhoidectomy.

Walter M. Brickner, M.D., F.A.C.S.,
Associate Surgeon, Mount Sinai Hospital; Attending Surgeon, Broad Street Hospital and Park Hospital,
New York City.

I. FECAL CONTROL AFTER AMPUTATION OF THE RECTUM.

No type of so-called "artificial anus" yet devised is a satisfactory substitute for the normal sphincter ani. Twisting the bowel after rectum amputation, as originated by Gersuny and as also employed in Lilienthal's colostomy, may slow up the fecal current, but as a measure of control it is not sufficient. If after amputation of the rectum there are provided no other means of managing the flow of feces than the application of a pad or apparatus to receive the irregularly—more or less continuously—escaping, and sometimes fluid, stool, then, I concede, an abdominal ("inguinal") outlet will be less inconvenient for the patient than a "sacral anus." But if he contrives to have solid stools and to evacuate these at definite times, then he is, in my opinion, far better off with a "sacral" (or, more properly speaking, "coccygeal") than with an abdominal outlet, both because it is less loathsome and because it allows him to defecate into a toilet seat.

In cases that I have been able to keep under observation after amputating the rectum for carcinoma I have found it possible to keep the patients clean and comfortable by training their bowels to evacuate at a fixed time once a day, or once in two days, and by so restricting the diet as to make the stools solid. With an outlet posteriorly such individuals can use a toilet seat much like other people and, for the most part, are troubled with soiling only when, through lapses in their diet or otherwise, they have loose movements.

When a sigmoidostomy is performed as a palliative operation the lower down in the loop the opening can be made the larger is the reservoir left above the outlet and the greater the opportunity for inspissation of the feces.

Two rather dissimilar cases may be cited to illustrate that, by training the bowel and regulating the diet, individuals without a sphincter ani may nevertheless be kept clean and comfortable:

Mrs. T. H., aged 50, had a carcinoma of the rectum about an inch above the internal sphincter. I removed the rectum and part of the sigmoid by a modified Kraske operation, and made the outlet at the lower end of the sacrum, after twisting the gut three-quarters of a turn. Thanks to a constipated habitus very little regulation of her diet was necessary. She moved her bowels once daily on the toilet seat and seldom had any soiling.

John G., a young marine, came under my care in the summer of 1918 while I was in charge of the surgical service of U. S. Army Base Hospital 3 in France. Crawling forward upon his belly in the Belleau Wood engagement he was struck in the anus by a fragment of a "high explosive" shell. Some weeks later when he was brought to the base hospital on a litter, the anal outlet was occupied by a circular cicatrix and large scars extended therefrom into each buttock; he had no control of his bowel movements and was continuously lying in feces. In order to determine the possibility of a plastic restoration, I dissected away the anal scar and made a careful search for any remnants of sphincter muscle. No fiber of either sphincter was to be found and even the levator attachment at this site appeared to have suffered. Nor could an attempt be made to fashion a sphincter from the gluteal muscles, for these were absent on both sides in the neighborhood of the anus—either destroyed by the missile or sacrificed in the operation of débridement. It seemed to me that to substitute an abdominal outlet (sigmoidostomy) would probably make the condition much less, rather than more tolerable; and I decided against any such surgical procedure until a trial had been made of securing control of the bowel movements by diet and training.

In spite of the limitations of a hospital mess in the war zone we found it possible to select such articles as, with the assistance at first of some opium, quickly reduced the number of evacuations and produced solid stools. Within a very short time this marine was able to resume his previous habit of defecating once daily at a fixed time, and this he did comfortably and cleanly in the toilet or latrine, and with no soiling in the intervals. When this status had been satisfactorily established he was sent back to the United States. He wrote to me recently from Chicago that he is "well and happy" and that he conducts his business as a traveling salesman with very little inconvenience from his sphincterless anus.

II. A HELPFUL EXPEDIENT IN FISTULA OPERATIONS.

One of the chief causes of failure after an operation for fistula in ano lies in the failure to deal with some undetected portion of the fistulous tract. Especially when its wall is not thickened, a branch of the fistula may easily go unrecognized at operation. As a means of obviating this, I published ten or more years ago in the editorial columns of this Journal the following "surgical suggestion":

> Injection into a fistula in ano of a staining solution or a colored paste makes it possible for the operator to assure himself that all branches of the tract have been explored.

A year or two later the same procedure was described by a German surgeon as a contributed article in the *Centralblatt für Chirurgie*. Perhaps Hippocrates himself antedated both of us in employing a device so obvious that it is surprising that surgeons do not more often make use of it.

Almost any available staining solution (e.g., methylene blue) or ink may be used, and with almost any small syringe having a tip or attachment, preferably blunt-pointed, that can be pressed into or passed into the mouth of the fistula. A gauze compress held over that point prevents spattering of surplus or reflux stain. When no particle of colored tissue is left in the wound the surgeon may be sure that he has removed *all* of the tract, however branching.

A fistula not too complicated may, in suitable cases, be completely excised without at any place cutting into it. Staining the tract with a dye lends certainty to the technic; and the dissection is further aided by passing a probe into the tract, circumcising the outlet and then clamping the probe to that site with an artery forceps.

The dissection of sinuses and fistulæ elsewhere in the body is equally facilitated by thus staining them. When a cyst or other cavity lies at the bottom of the tract—and notably in the case of thyroglossal cysts—it is worth while to substitute for the staining solution a colored paste of petrolatum or, still better, paraffin which, hardening in and distending the cyst, makes its nice dissection more simple and more certain.

III. A TECHNIC OF HEMORRHOIDECTOMY.

For several years I have been employing a technic in the removal of hemorrhoids and in the aftertreatment that has been uniformly satisfactory. With the sphincter stretched and the piles prolapsed, each of these is seized with an Ochsner or other artery forceps. Beginning with the lowermost hemorrhoid, and using the attached forceps as a handle to raise it, the inferior third (more or less) of the hemorrhoid is cut away with a knife incision from each side. Immediately the cut edges of mucous membrane are approximated with interrupted stitches of fine *chromicized* catgut which also pass through the exposed tissue. The ends of each stitch, in turn, are used as a tractor, to bring the cut edges into proper alignment, until the next stitch is tied in place; after which they are cut away.

Then the next third of the hemorrhoid is amputated and the wound immediately closed. A second forceps is now applied to the mucous membrane just beyond (above) the pile and the last portion is removed. The artery, as cut, is caught and tied. Using the second forceps and the last applied stitch as tractors the final portion of the wound is closed. The same procedure follows with the other hemorrhoids, the number of successive cuts by which they are removed varying with their size.

When hemorrhoids are in contact or more or less "confluent," forming an imperfect ring about the anus, I remove them by a modified Whitehead operation, employing the same technic of cutting and immediately sewing one segment after another, which assures accurate apposition of the cut edges, point for point. Here, however, the wound, instead of being in the axis of the bowel, is circumferential. There are always two or more areas in the circle where there is no actual hemorrhoid presenting. If two or three places in the anal ring are left uncut there will not follow, from this procedure, that common sequel of the Whitehead operation—a stricturing cicatrix, which brought it into disrepute.

At the conclusion of the hemorrhoid operation I often apply some compound tincture of benzoin (friar's balsam), which forms a protecting film, much as collodion does on the skin, and stops any slight oozing. If I think it desirable to insert a tampon-canula or "whistle," I use only a *slender* piece of tubing, with but a thin wrapping of gauze, and *remove it the next day*—otherwise, in my experience, it tends to produce a troublesome edema.

Deodorized tincture of opium is administered in ten minim doses twice daily for five and a half or six days. For the first three days the patient has only fluid diet—broths, soups, tea, coffee, but not milk. On the fourth and fifth day I allow milk in limited amounts, or custards, eggs, cereals, bread and butter. Usually on the fifth day the patient may be out of bed, in a chair or walking a little. On the sixth day meat, vegetables and some fruit are added to the diet. On the seventh day the bowels are moved *with the patient recumbent,* by means of two ounces of castor oil.

If the diet is thus restricted there is no difficulty in confining the bowels for seven days or even longer, and the patient usually experiences no discomfort thereby. Delaying the defecation for a full week gives the wounds an opportunity to heal; and when accurately and completely sutured they do heal either *per primam* or so nearly so that they require no further local treatment. Both the cautery and the ligature operations produce sloughs which leave areas that must heal by granulation and thus often require continued treatment. Cutting and immediately suturing one segment after another not only secures perfect apposition of the wound edges but also promptly controls the bleeding at operation.

151 CENTRAL PARK WEST.

PAPILLITIS (HYPERTROPHIED ANAL PAPILLAE).

SAMUEL GOODWIN GANT, M.D., LL.D.,
NEW YORK CITY.

Hypertrophied or inflamed anal papillae are common and though easy to diagnose are frequently overlooked or mistaken for another disease.

Anal papillae are multiple, triangular, pointed dentations located upon the edges of crypts at the muco-cutaneous juncture, composed of stratified epithelium, connective tissue, ateriole and nerve filament, and endowed with a special sense which when destroyed by operation leaves the patient without warning upon the approach of feces.

Normal papillae are scarcely visible, but enlarged inflamed papillae are easily brought into view with the anoscope or through eversion of the anus.

These structures may become enlarged through traumatism, passage over them of irritating discharges and extension of inflammation from adjacent ano-rectal lesions.

Hypertrophied papillae have a saw-tooth-like shape, pink base and whitish apex directed upwards, unless very large, when they assume variegated shapes and protrude during defecation; following which, owing to contained erectile tissue they retract producing crawling sensations.

Papillitis is rarely encountered alone, being usually associated with hemorrhoids, ulceration, fissure or some lesion accompanied by an acrid discharge.

SYMPTOMS:—Hypertrophied papillae may persist without manifestations, but when large they incite sphincteralgia, pruritus ani, desire to stool, tickling sensations, slight mucoid discharge, and they intensify constipation by causing sphincterismus.

DIAGNOSIS:—Having elicited the above symptoms there should be no difficulty in diagnosing papillitis, because enlarged papillae are easily inspected through the anoscope, detected by digital examination or brought into view by separating the anal margins.

Hypertrophied papillae are occasionally mistaken for skin tabs, polyps and venereal warts, from which they are distinguished by their reddish base, pointed extremity and hypersensitiveness.

TREATMENT:—When papillitis is secondary to or associated with hemorrhoids, ulceration, fissure and other lesions the complicating disease must be corrected or recurrence follows.

Acute manifestations of papillitis may be alleviated by hot oil injections, application of heat over the anus and introduction of a suppository containing morphin or cocain (gr. ⅛) and belladonna (gr. ¼) and ichthyol to allay sphincteralgia and reduce inflammation, a line of treatment that is in no way curative.

Inflamed or enlarged papillae are easily and permanently destroyed by *crushing, fulguration* or *excision* after they have been anesthetized with a cocaine solution (⅛%) and brought into view with a tenaculum or forceps with or without an anoscope.

I prefer to snip off enlarged papillae with scissors leaving the wounds to heal by granulation, or excise their distal segments following application of a ligature about their base.

The operation requires but a moment, confines the patient to bed but a day and gives permanent relief.

In aggravated cases divulsion or incision of the sphincter is advisable, and when post-defecatory pain is severe or wounds are hypersensitive application of the following ointment, applied externally and internally morning and night through a pile-pipe, keeps the patient comfortable:

Hydrarg. chlor. mit., ext. belladonnae, aa ʒss, ungt. stramonii, q.s. ad ℥j. Misce et fiat unguentum.

Sig:—Apply as often as required.

616 MADISON AVENUE.

TUBERCULOUS FISTULA IN ANO.

It is a perplexing question to determine whether a given fistula is tubercular or not and also to decide upon the proper treatment. There is a feeling of timidity about operating sometimes lest the wound in a tuberculous patient fail to heal. I operate upon tuberculous patients as willingly as on others if there is a chance of effecting a cure of the local trouble, because it relieves the patient of at least one source of waste and worry. A properly selected case will always heal under careful general and local treatment. Primary tuberculosis of the rectum occurs, although not commonly, and when it does the patient may be spared extension and a complete cure obtained by early removal just as in tubercular testicle.—CHARLES J. DRUECK in the *Mississippi Valley Medical Journal.*

VACCINE TREATMENT FOR PRURITUS ANI.

Possible Reasons for Failures with Stock Vaccine Treatment.

DWIGHT H. MURRAY, F.A.C.S.,
SYRACUSE, N. Y.

It is now nine years since I read my first paper setting forth what I had proved to my own satisfaction to be the eitology of pruritus ani, one of the most stubborn diseases that we have to treat.

My first papers when published, brought forth the usual crop of scoffers and unbelievers, but they were all numbered with those who had not investigated the truth or falsity of the claims. At least one prominent dermatologist said that it was the most foolish claim he had ever heard put forth, and that he had laid my reprint aside, intending to use it as a text for a paper on "Fakes in Medicine"—this without making an investigation.

It has now been my satisfaction to see one after another of those who at first did not credit the infection theory, acknowledge that it has been proven correct, and others found the infection in a greater per cent. of cases than I had published.

After nine years of research, we find practically 100 per cent. of the cases to be the result of the local infection. At the time of the discovery, treatment was, and always had been unsatisfactory. Many of the drugs in the pharmacopoeia and the extra-pharmacopoeia had been tried without success, the profession was baffled, the patients were discouraged and went from one doctor to another, chasing the igniis fatuus of relief without getting it, submitting to operations, with the same failure as to results in most cases, as had been my experience.

After discovering the etiology, it seemed to be up to me to find a method of treatment that promise some measure of relief, and knowing that autogenous and stock vaccines were being used in chronic local infections with a measure of success, I had autogenous vaccine made for each of my first cases and used the vaccine treatment experimentally. When the preliminary reports were made, it was noteworthy that they were very similar, the patients stated that the first changes noted were, longer interval between attacks of itching, and a lessened intensity when it did occur. They said further that a little rubbing or scratching of the parts relieved them, as happens on other parts of the body, without the intense desire to dig the skin until it was made sore and bleeding as had previously occurred.

This made it appear that autogenous vaccine was giving relief, and the vaccine treatment has been continued; first, because of the good results, and second, for the want of a better treatment. In all my papers on the subject, I have begged of the profession that they take up some original work to develop a better plan along some other line, or an improvement of the vaccine treatment and I would heartily welcome it. Benefit for the patient is my chief desire, and now that the etiology is established, it ought to be much easier than when guesswork as to etiology held the boards.

I know the extreme difficulty of getting bacteriologic work done in practically all of the smaller and many of the larger towns throughout the country, yet these sufferers are in every locality, and for this reason I experimented with stock vaccine, hoping for relief as with autogenous vaccine. I had experimented with stock vaccine on my own patients a number of times with good effect, and felt that if it could be made in commercial quantities, it might help many who could not get autogenous vaccine, and even if not more than 25 per cent. of cases were improved, it would be worth while, and a distinct advance over conditions then existing.

Four years ago the biological department of a commercial firm took up some experimental work, and found the streptococcus infection in 100% of the cases. I took the matter of stock vaccine up with them and suggested a polyvalent vaccine from the strains of eight successfully treated cases. This was made at first of the strength of 2 billion dead germs to 1 c.c., made sterile by heat. My experience led me to believe that heat lessened the efficiency, and I asked them to sterilize with trikresol, 1/3 of 1%, or phenol, ½ of 1%, and to make the vaccine of a strength of 3 billion to 1 c.c.

I asked this because I believed we were getting better results with strong vaccine. I applied for a quantity for comparative testing but I received none until it was reported that they had discontinued making the stock vaccine, because of reports from fifty observers who had been testing it, that less than 90% of cases improved under its use, and they felt it unwise to market a vaccine that did not show 90% of relief. I tried to get the reports of these collaborators, but received only four, therefore I cannot tell why all these observers did not get satisfactory results.

I am exceedingly anxious that stock vaccine shall be successful, although I have never found it as effective as autogenous vaccine, and have so published my experience. I have had good results with its use but not as good as with autogenous vaccine.

I know that all cases are not successful with autogenous vaccine and the principal reasons for these failures are, that in most instances too small doses are given, they are given too far apart, they are injected too deep into the muscle, they are not continued long enough, the vaccine may be too weak, or there may be a complicating infection. The operator may make the patient very skeptical at the outset of treatment by saying that "some one is writing about this treatment; it might be worth while to try it as an experiment; I know nothing about it, but will try the experiment if you want to take the chance." On account of these remarks and past experiences the patient is skeptical before he starts, and if he does not note improvement within a half dozen treatments, or if he has a severe reaction that had not previously been explained, he is discouraged or scared and discontinues, forgetting all the years he has had the trouble, and all the different remedies he has used without more than temporary result.

Patients can take large doses of this vaccine. I often give 5 c.c. and sometimes 10 c.c. of a three billion vaccine, while some of the investigators report having used 1 c.c. of a three billion strength, and have given six of them in a month. No wonder they failed. Better never have started. Give large doses after you know how the patient can stand them. Don't be afraid of them. I also think that some men treating pruritus ani with vaccine expect too much in too short a time.

I have said in some of my past articles that a stock vaccine of streptococcus of other strains than streptococcus fecalis would do no good, yet I am still hearing of men who are trying it out. Do not do this, no good will come of it, and besides, it discredits the method unjustly.

I have written several times that there may be a complicating infection by staphylococcus aureus albus, b. coli., in which event the patient may get some relief by the use of streptococcus fecalis vaccine, but complete relief will not come until a vaccine of the complicating bacteria is used. I have demonstrated this several times. One case of this type had been treated by another physician with autogenous streptococcus vaccine, experienced slight relief, but after a considerable number of doses, it was thought to be a failure. At a later time, he was sent to me, and I used both vaccines with prompt and lasting relief. It is now two years since his last treatment and he says that he has had almost no trouble since. When I first saw him, he had been troubled fifteen years, and had tried every remedy he heard of.

I have mentioned several of these failures in my papers of past years, and have successfully treated them later.

When the patients have experienced no relief during the treatments and within a short time after discontinuing the treatments have had complete relief, this is explained by the probable fact that they remained in a negative phase with a continuous lowered phagocytic power during treatment, and when treatments were stopped, the positive phase came on with the increasing phagocytic power of the blood, and with it relief. One notable case, of several, of this type was Case 36, a woman who had pruritus ani and pruritus vulvæ for 45 years without relief before or during vaccine treatment. It was discovered improvement began in a few weeks, and she has now been six years with complete relief. Another reason for failure is when the physician has had no experience with vaccine treatment, he may be very timid about it, cannot reassure the patient, and thinks when relief does not come in four or five treatments that it is like all the other treatments that have never done any good, and he discontinues it before the patients have gotten fairly under way. I give four of these reports herewith, two of which are general and two of which are in detail:

New York City, May 16, 1919.

My dear Dr. Murray:

In answer to your letter of the 14th inst., would say that my experience with the stock vaccine of P. D. & Co. is confined entirely to two cases, one which I treated myself, and the other was treated under my direction by another physician. In both instances the results were good, but it was apparent to me that larger doses than of the autogenous were necessary. Although I was in favor of your getting out a stock vaccine, my belief today is that the results from autogenous are better. The fact that so much larger doses were necessary probably explains why P. D. & Co. gave up the making of the stock vaccine—the medical men not being acquainted with giving such large doses of vaccine of any kind.

Sincerely yours,

Anthony Bassler.

New York City, May 20, 1919.

Dear Dr. Murray:

Responding to your letter of recent date requesting, in condensed form, an outline of my experience with the streptococcus fecalis vaccine, I would state, that my impression as to its value, is entirely favorable. That it is innocuous so far as by-effects are concerned, it being seldom that a reaction is obtained, even in a monster dosage. I have given as high as 70 c.c. Improvement is usually progressive, and, after an intensive course on a rising scale of dosage, is maintained by an occasional dose at long intervals.

I find no difference in the results between the autogenous and stock vaccines.

Very truly yours,

C. H. Chetwood.

"Pruritus Ani (Stock Vaccine)"

by W. O. Green, M.D., Louisville, Ky.

Pruritus ani has long been regarded as a condition of numerous and varied etiologic factors. Likewise its treatment has shown a long list of remedies, both local and constitutional, which have proven more or less uncertain in value. A remedy which appears to show 66 2/3% efficiency should be gladly welcomed to our armentarium as a means of dealing with this too oft rebelious state. And, too, any remedy which opens a new field of usefulness in pruritus ani will reach a class of people who may be numbered among the most grateful with whom we have to deal.

In the following report of cases no attempt has been made to suggest the etiologic value of the streptococcus fecalis, which has been reported as present in more than 90% of the cases, though it would appear that some low grade of local infection plays an important part in the etiology.

From the data obtainable, there were no unfavorable results as sequellæ to the injections, and in the absence of bacterial findings doses of from one and a half to three billion dead bacteria were given without hesitation.

Case 1. Accountant. Single. Age 59. Family history good. Gives personal history of syphilis for which he has taken trips to Hot Springs and periodical courses of treatment for a number of years.

Was first seen in 1899, presenting multiple fissure and stricture of large caliber, apparently in the formation stage. Following operation and a course of treatment the symptoms disappeared and for several years there was no trouble.

In July, 1910, he applied again for treatment of an atrophic proctitis and mild pruritus. Relief followed a month's treatment. Saw him again in January, 1914, this time for pruritus accompanying a mild attack of proctitis which yielded to treatment in a few weeks. In August, 1917, he presented himself suffering with pruritus ani. There were at that time a number of small fissures about the anal orifice, together with a thickened brittle skin surrounding the anus. Occasionally the skin showed a slight watery discharge in connection with the periodical attacks of itching. Bowels slightly relaxed and there had been digestive disturbance for several days.

The first dose of pruritus ani vaccine, ½ c.c., was given August 28th, with a little change in the local condition. A second dose of 1 c.c. was given September 3rd and followed by some reaction and improvement. The third dose on the 11th of September was followed by complete relief. Another dose of 1 c.c. was given on the 24th, although there had been no itching. The patient was seen on January 9th, and again in August, one year later, and he stated that there had been no pruritus since the third dose.

A point of special interest will be found in no return of the trouble after a year, in the face of a former atrophic proctitis following a general specific condition. It is also noteworthy that the pruritus at first appeared to be solely a complication of the other trouble.

CASE II. School teacher. Single. Age 34. Family and personal history good.

Was operated upon four years ago for hemorrhoids and fissure. The convalescence was slow, but finally the wound healed, leaving a narrow line of scar tissue on the posterior anal canal.

She stated that for years there had been more or less itching about the anal margin. While never very severe, the itching had been sufficient at times to give her much discomfort and inconvenience. It appeared several times a day, and barring the movement of the bowel there was no time or condition with which she associated the trouble. There was no local discharge, but a tendency to constipation and with the passage of a hard stool, the itching always followed. There was very slight thickening and discoloration of the skin at the anal margin. The anus was small and with comparatively slight manipulation the skin became broken and occasionally bled.

Diagnosis of uncomplicated pruritus was made, and the case seemed one favorable for vaccine. Accordingly on September 10th, first dose of pruritus ani vaccine was given, 1 c.c. She complained that the vaccine made her very sore at the point of puncture and kept her generally depressed and uncomfortable for 36 hours with no change in the itching. The second dose was given September 15th, (½ c.c.) with no results, and on the 20th of September, a third dose of 1 c.c. was given with the same results as the first dose. On the 25th and 30th of September, ½ c.c. doses were given with negative results. The dose was again increased to 1 c.c. on the 4th of October. This time with negative results, after which the vaccine was discontinued. The patient returned about the first of the year, and had two more ½ c.c. doses with no apparent benefit. She was subsequently relieved by local application of heat and a mixture of carbolic and salicylic acids and glycerine. It is of interest to note in this case, with practically no associated pathology, the negative results after 8 doses of vaccine—an apparently favorable case for this form of treatment.

CASE III. Mrs. X. Age 31. Housewife. Father operated upon for tuberculous kidney; family history otherwise good. Patient had always been considered frail, though for the past years had gained much in weight. There was a difficult labor 5 years before, followed by complete peineal rupture and septicemia. An unsuccessful perineorrhaphy was done by a surgeon in a neighboring city and again by a local surgeon. Later the appendix, one ovary, and the uterus were removed.

From childhood there has been a tendency to periodical attacks of indigestion and in the summer attacks of diarrhea. After a hot bath there was usually much itching of the legs and the lower part of the back. Three months before consultation following an attack of indigestion there was prolonged diarrhea accompanied by much straining and pain at stool, intense itching about the anus and extending over the perineum and vulva followed. The local itching was associated not only with the bowel movement but with physical exercise and sometimes was very intense at night. There was incontinence of feces and gas, the gas frequently coming from the vagina. Examination showed a small anal orifice and an atrophied relaxed sphincter. There was an ulcer with considerable loss of substance in the surrounding tissue at the anal orifice. A recto-vaginal fistula was found, accompanied by an exceedingly sensitive rectum. The perineum was completely ruptured with great loss of substance on all torn surfaces. Vaginal tenderness and leucorrhea were marked. On the right side of the anus anteriorly could be seen a large area of macerated skin, the location of the intense itching. The patient sought treatment on account of the pruritis. Cleansing douches and stearate of zinc dressings were ordered and diet regulated.

Prurius ani vaccine was given January 8th, 18th, 25th, and February 15th. First dose was ½ c.c. and 1 c.c. on subsequent occasions. Slight reaction followed the first three doses, none in the last dose. Marked improvement after the first and second doses. Felt relief after the third dose, the relief also being manifest in the itching of the back and legs. Barring slight general itching once or twice since, there has been no return of the trouble.

Two points stand out in this case,—first, in contrast with case No. 2, this case looked unpromising at first for vaccines. And second, the final result suggests that the complicating pathology may have been coincidental or a contributing cause rather than an exciting cause.

RECAPITULATION.

1. Relief in 2 out of 3 cases, 66 2/3%.
2. Stock vaccine used.
3. Dose 1½ to 3 c.c., representing 1½ to 3 billion dead bacteria injected subcutaneously.
4. In the 1st and 3rd cases four doses given, in the 2nd eight doses.
5. Reaction slight and no unfavorable results followed the larger doses.
6. Leaky sphincter and local discharge did not prevent relief in case 3.
7. Co-existing pathology, local and general, commonly regarded as causative, may often be coincidental or contributory causes rather than exciting causes of pruritus.
8. Co-existent pathology, even when extensive, should not offer a contra-indication to vaccine treatment.
9. Further investigation is desirable.

Philadelphia, Pa., May 8th, 1919.

Dear Dr. Murray:

Parke, Davis & Company have written to me that you would like to have a copy of the report on pruritus ani vaccine which I handed them. I am, therefore, enclosing a copy, and wish to say that you can do anything you please with it,—criticise it, or me,—as far as you please. Like you, I am only looking for information, and I am not worried about the method.

Cordially yours,
COLLIER F. MARTIN.

Cases of Pruritus Ani, Treated by Injections of Streptococcus Fecalis (Murray)

By Dr. C. F. Martin.

Case I. Mrs. T. E. L. 60 years. 1917—Aug. 30, (began treatment), 1 billion S. F.; Aug. 31 (next day), nauseated all day; itching worse at night; Sept. 4, (four days later), 1 billion S. F.; nauseated and drowsy; Sept. 13 (9 days later), ½ billion S. F.; Sept. 24 (11 days later), ¼ billion S. F. Nauseated several days. Oct. 4 (10 days later) ½ billion S. F. Itching severe. Oct. 17 (13 days later), 1 billion S. F.; Nov. 7 (21 days later), 1 billion S. F.; Dec. 3 (26 days later), 1¾ billion S. F.; Dec. 21 (18 days later), 2 9/40 billion S. F. 1918—April 1 (three months) 1 billion S. F.; April 2 (next day), 1 billion S. F.; April 4 (2 days later), 1½ billion S. F. (Eleven doses). Has really made very little improvement. Has stopped all treatment at present, except local applications of 60% alcohol.

Case II. Miss I. F. 24 years. 1917—Oct. 30 (began treatment) ¾ billion S. F.; Nov. 5 (six days later), 1 billion S. F.; Nov. 10 (five days later), 1 billion S. F.; Nov. 16 (six days later), 1½ billion S. F.; Nov. 22 (six days later), 1½ billion S. F. No relief from itching or improvement in skin. Nov. 27 (five days later), 1½ billion S. F. Better. Dec. 4 (seven days later), 2¼ billion S. F.; Dec. 10 (six days later), 2¼ billion S. F. Almost free from symptoms for four days. Dec. 18 (eight days later), 3 billion S. F. 1918—Jan. 2 (fifteen days later), 2¾ billion S. F.; Jan. 11 (nine days later), 3 billion S. F. Skin better, but itching worse in anus. Jan. 22 (eleven days later), 2¼ billion S. F.; Jan. 29 (seven days later), 3 billion S. F.; Feb. 8 (ten days later), 2½ billion S. F. Thought she had some malaise after last injection. Feb. 18 (seven days later), 3 billion S. F.; Mar. 1 (fourteen days later), 3 billion S. F.; Mar. 15 (fourteen days later) 3 billion S. F.; Mar. 28 (thirteen days later), 3 billion S. F.; April 10 (thirteen days later), 3 billion S. F.; April 30 (twenty days later), 4 billion S. F. (Twenty doses). This case is in very good condition, but seemed to derive the most benefit from the removal of the skin from the anterior margin of the anus.

Case III. G. E. D. 1918—Jan. 10 (began treatment), 3 billion S. F.; Jan. 17 (seven days later), 2½ billion S. F.; Jan. 24 (seven days later), 3 billion S. F.; Feb. 7 (thirteen days later), 3 billion S. F.: Feb. 21 (fourteen days later), 3 billion S. F.: Mar. 1 (eight days later), 3 billion S. F.; Mar. 7 (six days later), 3 billion S. F.; Mar. 14 (seven days later), 3¾ billion S. F.: April 4 (twenty-one days later), 4 billion S. F. More itching last week. April 11 (seven days later), 3½ billion S. F. April 25 (fourteen days later), 4 billion S. F.; May 9 (fifteen days later), 4 billion S. F.; May 16 (seven days later), 3 billion S. F. (Thirteen doses). Very slight improvement. Seems to get more benefit from local treatment. Stopped vaccine.

Case IV. E. E. H. 54 years. 1918—Jan. 25 (began treatment), 1¼ billion S. F.; Feb. 2 (eight days later), 3 billion S. F.: Feb. 15 (thirteen days later), 3 billion S. F.; Feb. 22 (seven days later), 3 billion S. F.; Mar. 1 (seven days later), 3 billion S. F.; Mar. 8 (seven days later), 3 billion S. F.; Mar. 18 (ten days later), 3½ billion S. F.; April 5 (seventeen days later), 4 billion S. F.; April 11 (six days later), 3 billion S. F.; April 25 (fourteen days later), 4 billion S. F.; May 3 (eight days later), 3½ billion S. F.; May 13 (ten days later), 4 billion S. F. (Twelve doses). Stopped vaccine, as Mr. Harrison says they have no effect. Is getting better results from local treatment.

Case V. W. A. 45 years. 1918—April 8 (began treatment), 2 billion S. F.; April 22 (fourteen days later), 2½ billion S. F.; April 29 (seven days later), 4 billion S. F. Disappeared from sight.

Case VI. E. S. E. 51 years. 1917—Nov. 9 (began treatment, 4/5 billion S. F.; Nov. 21 (eleven days later), 4/5 billion S. F. (Two doses). Stopped treatment and later told me that 3 *x*-ray treatments cured him.

Case VII. Rev. J. F. O'N. 51 years. 1918—Jan. 19 (began treatment), 1 billion S. F.; Jan. 17 (seven days later), 2¼ billion S. F. (Two doses). Stopped treatment. No better.

Case VIII. Dr. W. H. M. 36 years. 1917—Dec. 1 (began treatment), 2¼ billion S. F.; Dec. 17 (ten days later) 3 billion S. F.; Dec. 24 (seven days later), 3½ billion S. F.. 1918—Jan. 4 (eleven days later), 3 billion S. F.; Jan. 9 (five days later), 3 billion S. F.; Jan. 22 (thirteen days later), 3 billion S. F.; Jan. 29 (seven days later), 3 billion S.F.; Feb. 18 (twenty-one days later) 3 billion S. F. (Eight doses). Thinks that the serum may have had some effect, but is not enthusiastic. (The skin is really much improved.)

Case IX. W. F. 39 years. 1918—Jan. 17 (began treatment), 1½ billion S. F.; Jan. 28 (eleven days later), 3 billion S. F.; Feb. 4 (seven days later), 3 billion S. F. (Three doses). Stopped treatment, and has consulted several physicians since.

Case X. Dr. S. D. T. 42 years. 1918—Feb. 4 (began treatment), 3 billion S. F. (One dose). About this time began taking daily doses of mixed vaccines for a cold. The pruritus promptly disappeared.

Drs. Bassler, Chetwood, and Green's reports are distinctly favorable to the use of stock vaccine. Case 3 in Dr. Green's series is exceedingly interesting and gives further proof of my claim, already published, that other rectal disease with itching plus skin infection by streptococcus fecalis is a coincidence, and the itching will not be benefited by operative precedure.

In Dr. Martin's series of ten cases, several reasons suggest themselves to me as to why improvement was not made. Case 1—Ten doses, then a three months' interval, followed by three other doses that were too small. Note the interval of days between doses, and the size of doses, 2¼ billion the largest; nothing but failure could be expected. Case 2 was treated more regularly, and with larger doses, but the case should have been treated more aggressively with increasing doses, and for a longer time in order that real improvement should have resulted. Case 3—about the same criticism as for Case 2. Case 4—the same criticism as for No. 2 and No. 3. All the other cases could not expect any beneficial results on account of irregularity, too long intervals between treatments, too few treatments; the size of the initial doses was all right but they should have been increased. I tell my patients not to expect benefit in any event until about the seventh treatment. Usually at about that time they report a lessened intensity of the itching and longer intervals between attacks.

One thing that stands out prominently in these reports and in all of my own work is that the use of this vaccine is inocous so far as by-effects are concerned, and one physician says he has given as high as 70 c.c., that improvement is usually progressive, and, after an intensive course on a rising scale of dosage, is maintained by an occasional dose at long intervals, and he finds no difference in results between the autogenous and the stock vaccines.

Permanence of Relief.—I have tried to make it plain in former papers that permanent relief cannot be promised to any patient whether autogenous or stock vaccine is used, so long as we do not know what it is that first lowers the phagocytic power of the blood against these bacteria. If this original cause of the lowered resistance still remains with the patient the relief will not be permanent.

So far as I know, vaccine treatment is the only method yet used that does raise the phagocytic power of the blood against these bacteria and it is found by blood test that itching ceases as the resisting power comes nearer to par, and when the phagocytic power is at par, the patients have no itching.

Operations and local treatments so far as we know, do not raise this resisting power in any degree, which accounts for the very temporary relief resulting from their use. It is therefore my opinion that we must continue with the vaccine treatment because it furnishes the best and most permanent relief yet found.

CONCLUSIONS.

1. Stock streptococcus fecalis vaccine is not quite as efficacious as autogenous vaccine.

2. Failure to get relief is possibly the fault of the operator or because of a *complicating infection*, and should have *further bacteriological investigation.*

3. Large doses are inocous so far as by-effects are concerned.

4. It is a mistake to fill the mind of the patient with doubt as to the efficacy of the treatment or the ability of the physician in charge even though he has had little or no experience.

5. Correction by operation of local disease present with pruritus ani will not relieve the itching when an infection of the skin is present.

6. The presence of local disease with pruritus ani is coincident.

7. Stock vaccine should be made and supplied to the profession with the understanding that relief is not promised in any sense, but is expected.

8. Investigation and failures are good things and beget our earnest and careful efforts to find the truth.

9. Neither an investigator nor his work can be considered the last word, for which reason we should all work together without bias to the end that the best results of treatment may be found for these unfortunate sufferers.

201 Physicians' Bldg.

TREATMENT OF PROTOZOAN INTESTINAL INFECTIONS.

John L. Jelks, M.D., F.A.C.S.,
Memphis, Tenn.

It would seem egotistical for one to assume the role of teacher, in a matter so important and varied as protozoan intestinal infections, but it is not so much the idea of the writer to give the treatment of a disease or the panacea for each of a series of protozoan infections, as it is to display some of his iconoclastic views concerning some, thought-to-be infallible remedies. Hence this contribution.

For more than twenty years I have seen from one hundred to five hundred of these infections annually; and my most conscientious duty has always been to consider the earliest complete cure of the disease with removal of its cause. I, therefore, have sought knowledge of other men with, in many instances, a reminder that, "Hope springs eternal in the human breast. Man never is but always is to be blessed."

My reference to protozoan infections should be to those with which I am constantly dealing, and not with a long list, some of which I have no knowledge of, and I shall consider first, the ameba infection, because that is perhaps the most prevalent in the South at this time. This infection is primarily an intestinal one, but this period of its exterior activity is quite limited.

The entrance is by the mouth, and probably always of the cyst rather than of the organism in the hystlytica, or the tetragena cycle. The gastric juices would probably kill the active, young, free ameba, unless ingested in large numbers in a solution which would remain neutral in gastric transit.

These cysts rupture in the gut, and the young amebae find lodgment at some pocketing fold of the intestine, such as the cecum, appendix, hepatic or splenic curves, or on the rectal valves, and very soon they penetrate to the submucus structures of the gut wall, into the lymph spaces and channels, and even the veins, when they can no longer be considered an external or local infection. Any treatment, therefore, which has for its sole object the destruction of an external or gut infection, falls far short of the ideal. As long as this is not considered a patent fact, the treatment must be misleading and disappointing.

These are important facts relating to the life cycles of the ameba dysenterica. First, the hystolitic and tetragena cycles are limited, whereas the cyst stages are varied. Second, symbiosis seems necessary in each.

The pathogenic ameba is a phagocyte, subsisting upon his host, and not upon his symbiotic bacteria, or the mixture contained in the gut.

The infective organism is both external to and internal to the body tissues, hence must be attacked from within and without.

Symptoms are valuable when they are present, but the absence of symptoms affords opportunities for this and other protozoan infections to cause irreparable damage.

I have seen cases of extreme secondary anemia and emaciation due to chronic amebiasis, in which ulcers and old scars were numerous, yet only alternating mucous diarrhea and constipation were complained of. I have operated upon amebic abscesses of the liver, in patients who denied ever having suffered diarrhea. So we must conclude whatever treatment may have been pursued, or whatever period of time since the lapse of symptoms, a definite knowledge of results can not be obtained except by repeated proctosigmoidoscopy, and microsopic examinations for both the active and phagocytic ameba, and the stained specimen for cysts. These examinations must be preceded by diet containing carbohydrates and other foods, such as ham, which raise the bacterial and bacillary flora, and finally a saline cathartic in sufficient doses to liquify the bowel contents. This course is equally important in the examinations made for flagellate infections, which latter inhabit the small gut, and must be washed down into the large intestine in large numbers, as they will be by Epsom salts.

I find very many cases of amebic infection that have been reported as cured, most of them by medical treatment, some by both medical and surgical treatment. Some have been dismissed only a short while before I see them, others months and even years before.

One patient who contracted amebiasis in the Philippines had been "cured by the ipecac treatment." After returning to the States he "was cured" by appendicostomy and irrigations for some weeks with quinine solution. This latter having been so successful, a second operation was performed to close and drop the gut. When he was referred to me the ulcerations were extensive, deep and ragged. The gut was somewhat stenosed by cicatrization of old ulcers. Scrapings from the ulcers showed vast numbers of pathogenic aebae, each of which contained from one to a dozen red blood corpuscles.

He was anemic and wholly incapacitated for any duties. He refused to repeat the process of cecostomy and trans-colonic irrigations, but, I understood, took the emetine and other treatments at intervals during the last two years. His last treatments were in the General Hospital, where intestinal perforations and peritonitis resulted in death. Autopsy showed also multiple abscesses in the liver.

Here I pause to express my regret that good men, those who have held the ears of their professional brothers far and near, have not considered well the dangerous effects of their glowing descriptions of wonderful cures of amebiases. This infection is so destructive, so really difficult to eradicate, so menacing to others with whom a carrier is associated in the rural districts during the summer, so insidious and so deceptive, it is a sad mistake to pronounce a case "cured" when the infection still exists. Yet presidents and chairmen of sections in medical associations; men of national acquaintance and distinction, have not weighed this mistake as I have.

I have not told any one for years that I knew him to be entirely free of an ameba cyst, which might at some future time set at liberty four young ameba and thus by propagation destroy him, or through the careless disposition of excrements menace the health and life of another.

Dare not one of these allege my failure to give emetine in sufficient dosage and length of time; for I have some control cases who have taken from one to two grains daily until they were sore in all their limbs, and pity persuaded me to desist for only a few days and then to resume treatment. Yet after a short while either motile parasites of cysts would be found.

In some of these cases I have supplemented the emetine with alcresta tablets of ipecac, bismuth subnitrate, benzyl benzoate, zinc-sulpho-carbolate, and others.

It is my humble opinion that the symptom "dysentery" is promptly relieved in some cases of amebic infection by a few doses of emetine. Also that ulcerations heal rapidly, in some cases, almost as if touched by magic. But ameba infection is seldom, if ever, cured by the ipecac treatment in any form. I advocate its use, and use it in most cases that I treat, but I confess I dread and hate this enemy of man so that I have in an almost routine way, turned loose all guns on him.

These cases are never dismissed except with the injunction that they should report at intervals, or upon the appearance of symptoms, to some one capable and willing to use the time and the means I use, to tell them what their conditions are.

The general health and hygienic conditions are of prime importance in treating protozoan infections. Teeth and tonsils are sometimes found to be sources of infection, which impair the general health and resistance of the patient, and may add a mixture of infection to the gut.

Frequent tepid water bathing at least affords to the patient a sense of well-being. The physician has a poor chance in the treatment of protozoan intestinal affection if the patient's body, the living quarters and the environment are unsanitary. The possible source of a primary infection may yet exist in or about that home, and must be eliminated, or put under control to prevent re-infection.

Prevention has been my great aim in relation to protozoan infections.

Diet is an essential in protozoan intestinal infections. The diet that increases putrefactive changes, or that furnishes a favorable menstruum for the growth of either the organism or its symbiotic bacteria must be interdicted. A diet rich in vitamins, one leaving the least residue, and one free of carbohydrates is best. Albumens, pasteurized sweet milk, Bulgarian milk, Kumyss, whey, strained bean soup, cream, fruit juices, gluten bread and broths of fowls, are the selected diets in my cases.

Laxatives are as essential in diarrhea and dysentery as any other medicine. Especially is this true in all protozoan infections. Unless adynamia exists in a marked degree, a free saline catharsis washed from the tissues and the intestinal canal the greatest number of organisms, and relieves the mucous membrane congestion. Also when aromatic sulphuric acid is added to the magnesium sulphate the results are analgesic and astringent, and the intestinal content becomes an unfavorable field for growth of parasitic or bacterial life.

Water can readily be replaced in the tissues when the torminia incident to the offending mucus and infective content and the mucous membrane congestion is relieved. If salines are contra-indicated castor oil and mineral oil in often repeated doses may be given.

Many conditions are prone to arise in the course of these infections which must be met as they arise. In some, gastric irritability may require lavage and instillation of chlorotone. Gastro-intestinal spasm can usually be controlled by chlorotone or benzyl benzoate, but these may be supplemented by minute doses of opium, atrophine and hyoscyamus, morphine and atrophine. The two latter are required in some cases to control excessive osmosis indirectly. The ice bag is of great value in acute and violent cases.

When the intestines are prepared thus for the reception of so-called parastitic medication the treatment is simplified, and may be classified as: first, internal; second, external.

The internal or systemic remedies are emetine, iodine, zinc phenal-sulphurate, copper, phenol-sulphonate, ichthyol, vaccines in accompanying bacillemia and bacteremia, etc.

The external or intestinal treatments are both medical and surgical. The medical treatments are thyol, bismuth, subnitrate, in one or two drachm doses of the latter, followed in thirty minutes by 10 grain doses of phenol-methyl-formate in salol-coated capsules, ipecac and emetine, which latter, however, seems valueless in the flagellate diarrheas. Colonic irrigations by means of the Jelks recurrent colon tube with solutions of thymol, formaldehyde, boric acid, phenol-sulphonate of copper, iodine, ichthyol, quinine, olive oil, kerosene oil and astringents.

If the appendix has become infected by either of the protozoan infections all treatments, either internal or external, will be of no avail in the eradication of the infection until the appendix is removed. Only this week I removed an appendix in an amebic case, in which all the medical treatment above enumerated had been administered. The cecum was found situated extra-peritoneal; the appendix coursing downward and inward, behind the bladder, with abscess formation at its perforated tip.

Such appendices constantly reinfect the colon, and make it impossible to cure the case. In such cases appendico-cecostomy and irrigations for at least one year is the advice that I give. The same solutions as mentioned above and the same internal and intestinal medication as previous mentioned are likewise persisted in, with rigid advice that the patient's apparent perfect health and sense of well-being can not justify him in the assumption of indifference.

THE DIAGNOSIS OF ANORECTAL DISEASES.

Alfred J. Zobel, M.D., F.A.C.S.,
Chief of Department of Rectal Surgery, San Francisco Polyclinic and Post-graduate School; Lecturer on Proctology, Leland Stanford, Jr., University,
San Francisco, Calif.

It is a truism among physicians that most of their patients having anorectal symptoms, and coming to them for treatment, have already self-diagnosed their trouble as "piles." It is regrettable that too frequently the patient's idea as to what ails him, is accepted by some of them without further questioning, and without thought of any necessity for examination. A prescription is given for an ointment or suppositories for the supposed condition, without any further care being taken to ascertain what the real one might be. Later on, as the patient fails to improve, or becomes worse, another physician may be consulted, who, being more careful and painstaking than the first, makes a thorough examination, and perhaps finds that the symptoms complained of are not caused by hemorrhoids, but by an entirely different lesion—at times, unfortunately, by a malignant growth. Such unnecessary, humiliating, and vital errors can be avoided if a careful routine examination of the anorectal region be always made whenever there is complaint of any symptom referable to these parts.

Pain, bleeding, itching, protusion, the discharge of pus or mucus, constipation and diarrhœa are the principal symptoms complained of by those having anorectal trouble. One or more of these symptoms engage the patient's attention, and finally urges him to seek relief. The medical advisor's duty is then, first of all, to seek the cause. If found, he is put in the best position to supply the correct remedy.

Pain:—Uncomplicated internal hemorrhoids rarely give rise to pain. There are many individuals in whom they have been present for years in quite a well-developed form, without their being in any way aware of their presence. Others, with the same condition, may experience only a sense of fulness and discomfort in the rectum. However, when the hemorrhoids become inflamed, ulcerated, or strangulated, pain then becomes a predominating symptom.

Cutaneous hemorrhoids are painful only when they are inflamed by irritation or by infection.

External thrombotic hemorrhoids—those so frequently caused by straining efforts at stool, or by strenuous play at golf, as I have several times observed—are always quite painful and most annoying. Although the diagnosis is readily made upon inspection of the parts, yet we frequently meet individuals whose pain has been aggravated by ineffectual attempts at replacement of supposedly prolapsed internal piles.

One of the most common causes of anal pain is fissure of the anus. This lesion is usually single, and situated in either the posterior or the anterior anal commissure. When there are multiple fissures, thought should be taken of lues. The true anal fissure is also to be differentiated from the fine linear cracks often observed in the mucocutaneous tissues bordering the canal. The latter generally cause itching more than they do pain. The pain of fissure varies from a dull ache to such intense distress that the sufferer becomes worn out by its exactions. It is worse during and especially after bowel movement, lasting usually for several hours thereafter.

It is this pain, when they themselves are the sufferer, which most frequently urges my colleagues to call upon me for relief. They invariably express the fear that it may be caused by a cancer. It has given me a great deal of pleasure to watch their anxious faces light up after I had dispelled that dark cloud of dread from their minds by the positive assurance, after an examination, that an anal fissure, and not a rectal cancer, was the reason of their pain.

In young children, and also even in infants, a fissure is not an uncommon causative factor in the production of considerable pain. It should be sought for whenever there is no apparent reason for long-continued crying.

In the early stages of rectal cancer, pain is usually absent. The disease may go on to even complete obstruction of the bowel—that is when it is located in the ampulla, or in the upper third of the organ—without causing more than an indefinite sense of uneasiness in the parts. Should such a growth become ulcerated, then pain commences, not necessarily acute, but dull and heavy, and more noticeable after exercise, and at night. On the other hand, when the anal region, which is especially endowed with sensory nerves, is involved, there is early and constant acute pain, to which often is added most disagreeable heavy bearing-down sensations.

It may here be urged that whenever there is rectal pain the possibility of cancer should be ruled out. First of all a digital examination should be made. This tells as much, if not more, than the proctoscopic examination which follows.

In some individuals hypertrophied anal papillae give rise to most annoying crawling sensations, which to them is far more unbearable than would be definite pain.

Another common cause with severe anal pain —and one often overlooked—is inflammation and ulceration of a crypt of Morgagni. From the sufferer's description of his symptoms one would expect to find a fissure, inasmuch as the pain is very like that from such a lesion, with the exception that it is likely to be more continuous. If no fissure be found, each separate crypt should be carefully explored. When the search reveals the one affected, the examiner will be gratified to have his diagnosis confirmed by the patient exclaiming, "That's it! That is where I have my pain!"

Pain seldom occurs with a complete fistula unless the external opening closes, thus allowing sinus to become distended with pus. Sometimes, when least suspected, an internal blind fistula may be found to be the hidden cause of pain.

An abscess about the margin of the anus, in a crypt of Morgagni, or under the mucose of the upper border of the internal sphincter muscle, has often led patients to suppose that they had merely "an attack of painful piles." Even a beginning ischiorectal abscess has been so self-diagnosed. It hardly needs to be pointed out how vital it is that the exact nature of the trouble be quickly discovered, for it is only through prompt surgical measures that relief is secured, whereas from neglect there may be a resultant fistula.

Pain of a most distressing nature, being accompanied by continual tenesmus, may be caused by a foreign body impacted in the anal canal, or imbedded in the anal mucosa. The prompt relief to the sufferer which comes after a piece of chicken bone, a toothbrush bristle, or a sharp fragment from the core of an apple, etc., is removed, compensates one well for the time and care taken in the examination. A fecal impaction is another foreign body causing symptoms similar to the foregoing. It is surprising how often its presence remains undiscovered, even by otherwise good surgeons, simply because they have failed to make a digital examination of the rectum.

In acute proctitis there occurs spasmodic contractures of the anal sphincters, together with bearing-down feelings, which are so closely allied to sensations of pain, that they may truly be described as such. These symptoms are likewise present whenever the internal variety of hemorrhoids become inflamed and ulcerated.

Intense pain, sometimes steady, and at others darting in character, is a concomitant of rectal neuralgia, the rectal crises of tabes, and the rectal aura of epilepsy. While in my own experience these are rarely encountered, it behooves one to remember them as possible causes of very severe rectal pain whenever, upon examination of the anus, rectum and sigmoid, no disorder can be discovered. Likewise it should be borne in mind that rectal pain may possibly be but a reflex from disease in other organs—in most instances the genito-urinary organs, in either sex.

Hemorrhage:—"Bleeding from the rectum" is the one symptom complained of by those coming with "piles," which is noted more times than any other in the history records in both my service at the San Francisco Polyclinic, and in my private practice. There is a history of bleeding on and off for sometimes a year or more. Usually no effort has been made to find out its cause.

It might be said in passing that in most instances the hemorrhage will be found to come from congested and eroded internal hemorrhoids, yet, when it is remembered that it might be the first warning signal of the presence of a malignant growth—appearing perhaps as only a reddish stain of a slight mucous discharge—then it can be understood why this symptom, above all others mentioned in this paper, is the one especially deserving of the closest scrutiny and promptest attention on the part of both patient and physician.

The amount of blood which the patient claims is lost is not always to be taken at his own estimate, for only few individuals are sufficiently careful observers to be able to state it accurately. As a rule more is thought to have been lost than really is. It is often the reddening in the lavatory bowl by a slight bleeding which gives the idea that there has been a profuse hemorrhage.

Bright red blood usually comes from somewhere fairly low down in the rectum, or from the anal canal. When the bloody discharge is dark in color, contains clots, or is tarry in appearance with a characteristically foul odor, it generally has its source in a lesion located higher up in the bowel, in an area with which the internist or abdominal surgeon is more concerned than is the proctologist.

Bleeding from internal hemorrhoids at times may be constant and even very profuse, especially when they are chronically prolapsed. The same may be said of varicosities situated high up in the rectum, when they rupture. Both quite frequently cause a severe anemia, the reason for which often remains unsuspected until a proctoscopic examination discloses the trouble.

There is rarely any bleeding from external thrombotic hemorrhoids, but on several occasions I have seen cases where the stretched skin had broken, the clot had been only partially extruded, keeping the vein open, and thus allowing a small but steady stream to trickle out on to the clothing.

When children bleed at the rectum, parents seem to bring them quicker to their physician than they do for any other rectal symptom, except that of protrusion. In children bleeding is rarely due to hemorrhoids. It is far more apt to come from a solitary, polypoid, pedunculated adenoma, which bleeds easily and is usually attached to the posterior wall of the lower end of the rectum, just above the internal anal sphincter.

In small children, especially in those badly constipated, when a fissure exists, a drop or two of blood may be squeezed out at the time of defecation. When there are multiple fissures—early evidence of hereditary lues—the bleeding is freer, not only during but also between the times of bowel movement.

In both adults and children quite severe hemorrhages may take place from multiple polypi of the bowel wall, and from the hemorrhagic and the amebic forms of colitis.

Considerable oozing of blood occurs when a chronically prolapsed rectum has been long traumatized by friction against the clothing.

Fine linear cracks in the tissues immediately surrounding the anal orifice, and simple fissures, do not bleed as a rule, unless scraped by hardened feces at defecation. They then may bleed sufficiently to well stain the detergent toilet paper, and so arouse the patient's fears.

Other causes for rectal bleeding may be injurious to the anal or rectal mucosa, the result of the passage of excessively hard large fecal masses, or of sharp irregularly-shaped foreign bodies, or caused by improperly directed or roughly inserted syringe tips, rectal thermometers, and examining instruments.

Itching:—This most annoying, distracting, and it may be added, persistent symptom, oft times requires all the examiner's patience, skill and experience in the effort to discover the causative factor. Sometimes the itching sensation may be found due to purely external causes, such as a dermatitis, eczema, herpes, pediculi, parasites, etc.; at other times it is a concomitant symptom of some constitutional trouble, as diabetes, etc.; while at still other times it may be but a reflex from disease in other parts, particularly in the genito-urinary organs.

A number of anorectal lesions give rise to pruritus and in greater or lesser degree. Fissure of the anus, shallow ulcerations in the proctodeum, abraded internal hemorrhoids, small thrombi under the mucosa of the anal canal, subacute proctitis—often the result of dyschezia, and not infrequently the result of prolonged or rough massage of the prostate gland—catarrhal colitis, rectal growths, particularly in the lower rectum, hypertrophied papillas, disease of the crypts of Morgagni, small blind fistulas, etc., have all been accused of being the sole causative factor by different observers. Infection of the perinal skin by the streptococcus fecalis also has been claimed as a most important agent in the production of anal pruritus.

A mere inspection of the perianal skin, which is too often done, even by those specializing in dermatology, is not in itself sufficient to establish the diagnosis of the causation. A careful proctoscopic examination is just as imperatively needed, as it is for the other symptoms above-mentioned.

Protrusions:—To the laity any protusion from or about the anus is simply "piles." From some cases seen by me, it seems that there are not a few in the medical profession who evidently think the same, for they apparently have taken the patient's statement of his condition at face value, and prescribed treatment without making an attempt at examination. At different times the supposed hemorrhoids have turned out to be a prolapse of the rectum, a marginal abscess, an anus bulging from fecal impaction, a foreign body, condylomata, an epithelioma of the anus, a simple thrombotic pile, a swollen cutaneous tag, a small sentinal "pile," (which to the initiated betrays the fissure), or a pedunculated growth.

An interesting story—and one conveying a valuable lesson—of an incident that occurred in the ampitheater of a well-attended clinic in one of the principal medical centers of the country, may here be related. An old man was brought in complaining of piles which protruded very much at time of defecation. Without making a preliminary examination—such as he had always urged upon his classes to do—the clinician instructed the old man to squat over a bucket in the nearby corner of the room, and to bear down hard. The poor fellow did this, at the same time accompanying his violent straining efforts with considerable audible gruntings—all of which afforded much amusement to both students and clinician. After a time the patient said the protrusion was out, so he was told to get up on the examining table. When a large, nodulated and pedunculated adenoma, about the size of a closed fist, was exposed to view, the look of sympathy on the face of the class, and the expression of astonishment and chagrin on that of the teacher, surely must have amply compensated the old fellow for all the fun that was had at his expense.

Pus:—A suppurative discharge in or about the anorectal region may have its origin in a fistulous tract, or a recently ruptured abscess, both of which may be either external or internal to the anal orifice.

In that form of colitis where there is infection and severe ulceration of the bowel mucosa, there is sometimes so much suppuration that it is really remarkable what quantities are discharged.

Granulating surfaces of small ulcerations, or of fissures of the anus, quite often throw off a pus-like secretion, which by its irritating qualities causes an erythema of the perianal skin. So do condylomata about the anus. These have also a most disagreeable odor.

Pus appears in a free state, or mixed with mucus or feces, when the surface of malignant, or even of benign, growths of the rectum, have become ulcerated.

Mucus:—The appearance of mucus in the stools is another symptom which generally is a matter of concern to most individuals. It is fortunate that this is so, for the discharge of but slight amounts of mucus, usually tinged with blood, may in itself be the sole early warning signal of malignancy.

In almost every variety of colitis there is more or less excessive formation of mucus. In that called "mucous colitis," the production is at times so great that the name of the predominant symptom has been given to the disease.

It is claimed by some authorities that excessive quantities of mucus arise only when there is some point of irritation in the bowel. This should be sought for by a sigmoidoscopic examination.

A not uncommon cause of a mucus discharge, and one often not thought of, is the pernicious habit of using constantly daily hot enemata. The erroneous employment of this very valuable method of rectal therapy goes to keep up further trouble long after the one for which it was prescribed had disappeared.

Sometimes, on examination, the mucus will be found due to a chronic fecal stasis, a fecal impaction, a foreign body, or to a growth, especially one with a long pedicle. All these, by irritating the bowel mucosa, accelerate the abnormal production of mucus.

Constipation:—This is considered such a very ordinary symptom, that only little concern is felt about it by either patients or their physicians. Yet much can be learned regarding its causation by a digital and proctoscopic examination of the anus, rectum and pelvic colon. The cause may lie in a very tightly closed anal orific, with hypertrophied sphincter muscles, due perhaps to the presence of an ulcer, a fissure, a diseased crypt of Morgagni, or inflamed and ulcerated hemorrhoids, etc. Examining higher up, it may be discovered that the stasis is caused by a fecal impaction, an obstructing foreign body, a growth, a stricture, a deviated coccyx which pushes into the cavity of the rectum, an entire absence of the coccyx which allows of the formation of a retrorectal pouch in which the fecal matter accumulates, or a pelvic mass situated anteriorly and so occluding the rectal lumen that when it is accompanied by markedly hypertrophic valves of Houston it is apt to give the examiner the impression that a well-developed stricture of the rectum is present.

On proctoscopic examination we very often see such a spasmodic condition of the bowel—especially noticeable at the recto-sigmoidal junction—that the constipated state is well-accounted for.

In a normal bowel, upon the introduction of a tubular speculum the rectum becomes distended by the inrush of air. The valves of Houston then loom up quite prominently. When these are hypertrophied, or so placed as to be almost opposite each other, the onward passage of the fecal mass is greatly retarded. This is a frequent cause of constipation.

The symptom of constipation, like that of blood or mucus from the rectum, particularly in those of suitable age, is one which demands a thorough examination, with the idea in mind of excluding the possibility of cancer, as a cause. This should be done especially when there is a history of alternative changes from constipation to diarrhea, and vice versa.

Diarrhea:—Though, as has been stated before, the average individual is but lightly worried even when chronically constipated, the opposite obtains when he is troubled by a diarrhea, particularly if it has lasted for some little time. Yet even here, when medical advice is sought, it seems that there are some who find it far easier to prescribe an astringent mixture, then to make the proper examination before doing so.

It may be taken as an excellent, and a very safe rule, always to make a digital and proctoscopic examination in every case where, notwithstanding intellectual treatment, a diarrhea has lasted longer than a week. This may have to be supplemented by a fluoroscopic and radiographic examination, if no cause be discovered in that part of the bowel in the range of the examining instrument.

Diarrhea is usually the main symptom of colitis. The ameba may be the disturbing factor, and it should be borne in mind that it may be present in an individual even though he has never been in a country where the disease is endemic.

Diarrhea may also be occasioned by new growths, a bowel filled with hard, impacted feces, strictures, ulcerations, etc.

Conclusion:—No elaborate armamentarium is necessary to make the examinations essential for diagnosing most of the conditions here mentioned.

The index finger, covered by a thin rubber-tissue cot, thoroughly lubricated with vaseline, and gently inserted, is the best diagnostic instrument of them all, for by touch more information is obtained in certain conditions, than by sight. To the experienced examiner the "feel" of a growth means more than its gross appearance.

A two-inch anoscope, and a five-inch proctoscope, with illumination from either a good headlight or a reflecting head-mirror, provide all that is needed for visual examination of the lumen and walls of the anus and rectum.

For examination beyond the rectosigmoidal valve the electrically-lighted pneumatic sigmoidoscope, 20 or 30 c.m. in length, must be used. Passing this through the valve of O'Bierne into the pelvic colon requires some little skill and experience. As it is a procedure not entirely devoid of danger, the instrumentation should be done with gentleness and caution.

Excision of a Fistula in Ano.

The operation of excision of a fistula with immediate closure of the wound by sutures thus obtaining union by first intention is not very popular because of the large percentage of failures. The operation can be tried only where the sinus is straight, superficial and not over 2½ inches long and the sinus must not be surrounded by dense induration. If the sinus is otherwise it will be found impossible to accurately coaptate the edges without tension on the sutures, and there is always danger of the stitches becoming infected.—Charles J. Drueck in the *Mississippi Valley Medical Journal.*

FISTULA IN ANO.

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A fistula in ano is always the remains of a collapsed abscess cavity plus the channel it has made to the internal or external surface opening.

Etiology. It is always the result of an infection, most frequently through an abrasion or crack, made by the passage either of a hard stool, or some hard foreign substance in the stool, or by contusions, such as falls, or blows upon the buttock, In tuberculous cases the infection may result either directly through an abraded surface, or by the breaking down of a tuberculous gland in the vicinity of the rectum. The proportion of tuberculous fistulae to those due to ordinary pus organisms is about one-third according to my findings in several hundred fistulæ several years ago.

The proverbial subdivision of fistulae into the complete and incomplete varieties is not only very misleading but is very conducive to failures of operations. It may be taken as an axiom that if a fistula with an external opening fails to heal after several weeks of proper care and attention, it has an internal opening into the rectum, through which it is continuously reinfected, and hence the cause of failure to heal. It would be far better to classify them all as complete, because the exceptions are so rare, (not one per cent.) that they are scarcely to be reckoned with.

Symptoms and Signs. Redness; the previous history of continuous pain for several days; absence of inflamed hemorrhoids or fissue; by the introduction of a single bladed rectal speculum, (a medium size vaginal speculum will answer the same purpose) the pus can almost invariably be seen flowing from the internal opening. The speculum must be introduced on the sound side of the rectum, which will be determined by the swelling and redness.

If an abscess is not opened within two or three days after the symptoms have set in, it has almost invariably opened into the rectum spontaneously, and this happens because the resistance to the infiltration of pus and necrosis is much less in the direction of the rectal than the skin surface.

Treatment. It must be borne in mind that as soon as an abscess opens into the rectum, it becomes a fistula in the acute stage, as much so as if it had existed for six months, and to all intents and purposes it must be treated as such, namely, laid open from the external surface to the internal opening. In the early practice of aseptic surgery it became very popular to excise the chronic fistulous tracts *in toto,* under rigid aseptic technic, provided the internal opening was not more than two inches above the anal margin, and to close the wound immediately with deep buried sutures. But such a method was soon abandoned because it was followed by frequent failures, the reasons for which are perfectly apparent to those working in this field, such as the frequent presence of lateral and subfistulous sinuses, which would be impossible to recognize before the operation, and which would be cut through and infect the entire wound; also the difficulty of making such a field aseptic under the most favorable conditions.

When a peri-anal or a peri-rectal abscess is seen before it has opened, lose no time in puncturing it, no matter at what stage it is seen, even though the tissues have not broken down and formed a pus sack. The incision will relieve the tension and pain, direct the pus to the skin surface and prevent the pus sack opening into the rectum, provided the incision is made soon enough. Unfortunately, however, abscesses are seldom seen at a sufficiently early stage to avoid this.

I can recall very few instances where an early puncture resulted in an early healing of the wound without the formation of a fistulous tract. If the abscess cavity has opened internally when seen, I make a free external opening at once to make drainage more complete and to prevent further infiltration. If there is much redness and swelling at this time I apply warm fomentations for several days and postpone further operation until these conditions are relieved.

When the very acute stage has subsided I have the patient put under a general anesthetic and open up all intervening tissues between the external and internal openings, curette the cavity well, and if there is much necrotic tissue, swab it out with pure phenol. Be sure to excise all redundant tissue and over-hanging flaps, which will interfere with free drainage, especially within the anal cavity. Pack the entire tract with plain or iodoformized gauze that has been well anointed with borated, carbolated, or plain petrolatum to prevent it from sticking. This should be allowed to remain for two or three days, until it can be removed easily, although during that time the external dressings should be removed several times daily and the adjacent surfaces bathed with a solution of bichloride of mercury, 1/3000 or 1/5000. When the packing has been removed, replace it with a strip of several thicknesses of gauze, anointed and laid in lightly, not packed, merely to keep the edges of the raw surfaces separated until they become glazed over, after which all packing is discontinued, because it would keep the ends of the cut sphincter separated until the intervening space becomes filled in with scar tissue which gives rise to incontinence of feces.

The treatment of fistula in its chronic stage is very similar to that given above. We must always assume when a fistula continues to discharge for several months that there is an internal communication with the rectum through which it is reinfected and kept open, even if we have not been able to find it before placing the patient under an anesthetic. So confident am I of this fact that when a patient comes to me stating that he has had a discharge from an external opening I rarely attempt to find the internal opening until he is placed under an anesthetic for the operation

Since local anesthesia has been in use many elect to operate by this method, especially if the fistulous tract opens low down internally and is a direct channel from the external to the internal opening. This would be a rational procedure if we could always tell definitely whether or not the channel is direct, but frequently we have lateral sinuses which may extend some distance from the field of local anesthesia. Therefore I prefer ether anesthesia, unless there is some special contra-indication, such as pulmonary tuberculosis, even in the quiescent stage; in that stage ether is liable to light up the old pulmonary trouble. Nitrous oxide gas even when combined with oxygen is not sufficient to produce complete anesthesia of the anal area. Another reason for my preferring ether anesthesia is that frequently there are other conditions of the rectum which require surgical treatment at the same time.

Some prefer to divide the tissues between the external and internal opening with the cautery knife. This has some advantages, especially if there is any reason to suspect tuberculosis and it also does away with the necessity for packing the wound; a simple strip of gauze to facilitate drainage being all that is then necessary. I would recommend this method whenever a thermo-cautery is convenient. It has been advised to dissect out all the scar tissue in the wound. I think this an unwise procedure when you consider that this fibrous infiltration has been thrown out by nature as a barrier against the inroads of pathogenic organisms. I have known of three instances of acute miliary tuberculosis that have followed complete excision of a tuberculous fistula. If this is true of tuberculous infection it might as easily follow in cases where the other organisms are concerned.

TUBERCULOUS FISTULA IN ANO.

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For the title of this communication I prefer the caption "Tuberculous Fistula in Ano" to "Fistula in Ano Complicating Tuberculosis" for several reasons, among them to entirely differentiate the condition from fistula as commonly observed, or, to be more explicit, to note the difference clinically and pathologically, between two diverse forms of disease. The ordinary form of fistula in ano results from an *active* variety of inflammation, acute in character, with all the symptoms so characteristic of the onset of inflammation in any portion of the human anatomy, *i. e.*, pain, heat, swelling, redness, etc. Where such is found in one or both buttocks, it usually ends in an abscess of acute variety, and calls for an immediate evacuation of *pus*. Fistula in ano is likely to result from such abscess in a large percentage of cases.

This variety is caused by the invasion of the *pus* germ. In the tuberculous variety of fistula in ano an entirely different picture is presented. There are none of the symptoms present so characteristic of the other variety, no pain, heat, swelling or redness, but, on the contrary, we find a pale surface, a reduction of adipose tissue, cold instead of heat, and a "boggy" feeling instead of pain, and no abscess, because of the absence of *pus* germs.

The thin sanious discharge caused by tubercle bacilli is often mistaken for *pus*. This is a fair picture of the condition found around the anus, in tuberculous fistula. It is not the object of this paper to go into a discussion or description of the cause of the tuberculous condition so often found in this part of the anatomy, but rather to deal with the condition when found.

A theory exists that the tubercle bacilli are destroyed by gastric juice in digestion only after being exposed to its action for some time, and that it is considered probable that some of the bacilli in the tuberculous patient may pass through the stomach, into the bowel, unaltered and effect a lodgment in or along the walls of the rectum. This theory seems to me to be far-fetched, when it is so very well known that every organ and tissue of the body is liable to infection by the tubercle bacillus.

The main question to consider is: Shall a patient suffering from tuberculous disease who develops a fistula in ano be submitted to operation? Some of the old authors, amongst them Curling, Ashton and others, took the negative of this proposition, and the reasons advanced were curious to say the least. Says one, "if operated upon, the wound will not heal"; another, "if the wound heals it will cause consumption of the lungs." Modern investigation proves both statements to be vagaries. It would be sheer madness to allow a patient suffering from all the distress that a fistula in ano can cause, to permit him to put up with his condition, simply because he may be tuberculous. The only point to consider is, is he in a fit physical condition to have an operation?

That the wound will heal if properly made and cared for, is attested by many recoveries in my practice. As soon as the fistulous trouble clears up the patient begins immediately to improve. Many cases that I have operated upon prove this to be true. The idea that by curing the fistula one will cause tuberculosis in the lung is entirely erroneous.

A question of serious importance in regard to an operation upon this class of patients is the anesthetic to be used. Objection could be urged against the use of both general anesthetics, ether and chloroform. If a selection is to be made between them, I would prefer chloroform, because of less irritation to the lung, and the subsequent action on the kidney. It is, I think, almost impossible to operate upon these cases under a local anesthetic, which is used so frequently in operative procedures in this region, because one can not infiltrate a sufficient area to make the operation painless. The skin covering is often so thin that it would be impossible to inject at all, and one might spread the infection by puncture with the needle.

We have worked out a technique in our clinic at the County Hospital, where during my services for the past ten years, we have operated upon about two hundred of these cases.

To prepare the patient, flush the bowel the evening before, and the morning of the operation. We have used for the past several years, spinal anesthesia with all of these patients. This is the anesthesia of choice. It has none of the objections of an inhalent anesthetic, and has many advantages: Ease of administration; complete relaxation of the sphincter muscles; avoidance of nausea and vomiting, which often follows ether; and absence of shock following the operation. After using it in several hundred cases, without any bad results, I consider it the safest anesthetic.

As for the operation itself: I never touch these cases with anything but a cautery. I use a "Persey Cautery Knife" in preference to any other. First, the sinuses and cavities are thoroughly opened, then all of the overhanging edges are trimmed off. Most of these cases are superficial in aspect and have a tendency to burrow away from the anal canal and just under the skin. After the whole of the infected area is exposed, it is lightly cauterized, being careful not to burn the surrounding skin. If a fistulous opening exists into the bowel, which passes under the sphincter muscle, this must be handled very carefully or the patient will have an incontinence of feces. Not often does the fistulous tract go under the muscle, however, but usually runs over it, because of the tendency to burrow close to the surface. However, all of these tracts must be cauterized, whether the muscle is cut or not, in order to effect a cure.

The advantages of this procedure over the ordinary operation are: The patient loses no blood, which in these cases in very important; the tubercle bacilli are destroyed; the lymphatics are closed to absorption, and there is no chance of spreading the infection as in the ordinary operation. This spread of the infection is the reason why the men who have been doing a large amount of tuberculosis work object to having the cases operated upon, because they often had a relapse following and perhaps developed the trouble in another location. This is not true if the operation is well done. These patients have very little pain following the operation. The healing is slow, however, and the after-treatment must be attended to very carefully. The first few days, treat it as one would any burn, but after the slough from the cauterizing is cleared off, make frequent applications of iodine, or twenty-five per cent. argyrol; I have also found that fifty per cent. solution of Enzymol, as a wet dressing has stimulated healing in many cases. In some cases that are quite extensive, it may be necessary to use the cautery twice, or even three times, before it is entirely healed. I can see no objection to this if the patient is in a fair physical condition.

AN ILLUSTRATIVE CASE.

In February, 1917, Dr. Frank Pottenger referred to me Mr. K. W., for advice and treatment. He had had tuberculosis of his lung since 1913, and had been cared for by Dr. Pottenger at his sanitarium for several consecutive years. Under his most watchful and scientific care the man had improved steadily, but failed to get entirely well, because of the existence of an anal fistula, which had a continuous discharge, and which was undoubtedly of tuberculous origin.

On May 25, 1917, with Dr. Pottenger's approval, I operated upon the fistula. The technique was as above described. The patient began immediately to improve, both locally and generally; the wound healed perfectly; and in August, 1917, he was discharged as entirely well and returned to his home in Seattle.

In conclusion, these are a few special points to which I would like to call attention:

1. A tuberculous condition of the rectum may be a local condition, just as a tuberculous joint may be, and if cured by operation it may stop further progress of the disease by removing the focus.
2. If a tuberculous condition of the rectum is left alone it may result in a general tuberculous infection.
3. Granting that a cure of a general tuberculosis is not obtained, great local relief nevertheless results.
4. It must not be forgoten that many cases of tuberculosis are now cured, and if a local condition exists it must be eradicated before the general condition will be cured.
5. If tuberculosis of the lung is coincident with an anal fistula, the physician in charge should not fail to refer the patient for operation.
6. It should not be forgotten that a tuberculous fisula in ano is caused by tubercle bacilli, and not by the usual pyogenic germs.
7. The abscess fore-running a fistula in ano, that is the result of active inflammation, requires active measures, and the cure requires a prolonged treatment, both local and constitutional.
8. The failure to find tubercle bacilli in a suspected case, is not to be taken as a positive sign that the fistula is not of a tuberculous origin. The history of the case and the clinical signs may be sufficient to establish the diagnosis.

FISSURE-IN-ANO, OR IRRITABLE ULCER OF THE ANUS.

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The domain of surgery includes few diseases which, while so insignificant in character, produce such intense suffering as the malady under consideration, nor any in which proper treatment is followed by more prompt relief and positive cure. Although so simple in extent and character and so readily curable, it exercises a most potent influence in undermining the patient's health and strength, resulting from the intense pain and irritation to the nervous system.

A fissure, or irritable ulcer of the anal region, may be defined as a superficial breach of the mucous membrane, of a highly sensitive nature, characterized by intense paroxysmal pain which rarely accompanies the movement of the bowels, but sometimes does so. This pain begins usually about half an hour after a stool, the patient becoming conscious of a dull, burning sensation which grows increasingly acute, producing an effect similar to the application of a hot iron. After reaching its acme, which may take three or four hours, it gradually subsides until it ceases almost entirely and the patient enjoys a respite until the next evacuation.

Among diseases of the lower alimentary tract, anal fissure, in point of frequency, ranks about third. It occurs in the very young as well as the aged, though with much greater frequency in the latter. I have not met more than half a dozen patients, under fifteen years of age afflicted with this malady. Males are afflicted more frequently than the opposite sex, in the proportion of about four to three.

In shape the lesion may occur as somewhat circular, linear, or as most frequently happens, oblong. The shape is to be determined only when the part is fully exposed, as otherwise, what appears as a linear abrasion, often proves upon exposure to be an ulcer of some breadth. It never has much depth, and unless complicated—by which I mean the presence of a fistula—is very superficial, involving only the mucous membrane, though at times the muscular fibers may be exposed.

It may occur in any part of the anal margin, but by far the commonest site is posteriorly; next in frequency anteriorly; and only in very rare instances is it found laterally.

In a very interesting and comprehensive consideration of the etiology of fissure-in-ano, J. Rawson Pennington, (*Medical Record,* June 10, 1905), shows clearly that the site of a fissure-in-ano is influenced by the support given the anal canal by the muscular cylinder that surrounds it. Where it is the strongest, a fissure is rarely found and conversely. Experimentally, Dr. Pennington, with and without anesthesia, employed a conical anal dilator, which when forced into the anal canal, tore the dorsal surface first and almost universally, the anterior surface occassionally, and the sides rarely.

Wherever the lesion is found other than solitary —which is rarely so—a syphilitic, gonorrheal, or tuberculous origin is to be suspected. At the lower border of the fissure, or on one side of it, there is frequently found a small fold of skin, the so-called sentinel pile, its length varying, usually about three-quarters of an inch; and its breadth about half an inch or less.

Sir Charles Ball of Dublin is of the opinion that the vast majority of fissures are produced by the tearing down, during the passage of hard scyballæ, of the lateral attachments of the valves of Morgagni, and that the torn-down valve is to be found at the lowest end of the fissure where it constitutes the tag or so-called pile. This explanation may be the correct one, in some cases, but is far from invariably so; for I am inclined to believe with Mr. P. Lockhart Mummery, that the formation of these tags is due to the inflammatory changes in the base of the fissure, which tend to block the lymphatics and this in turn causes the skin at the lower end of the ulcer to become swollen and edematous.

A curious statement made by more than one proctologist is that in their experience these sentinel piles are not of frequent occurrence in cases of fissure. Such is contrary to my experience; and in the observation of many cases, I have found that where the fissure is of recent origin the skin tag is likely to be absent while in cases of longer standing, it is apt to be present.

In addition to constipation, as the chief factor is the causation of a fissure, the following causes may be mentioned: Congenital atresia of the anal orifice, eczema, herpes ani, rectal polypi, uterine displacement and enlargement, pelvic inflammations, syphilis and tuberculosis.

At the juncture of the anal skin and the mucous membrane is the point of contact of the two sphincter muscles, and in most cases it is marked by a line of condensed connective tissue, known as "Hilton's white line," which is of marked importance, anatomically, as it is the point of exit of the nerves, principally branches of the pudic, which descend between the internal and external sphincter muscles, becoming superficial in this situation, and are here distributed to the anal region. These nerves are very numerous and account not only for the extreme sensitiveness of the parts, but also for its abundant reflex communications with other organs. They also play a very important part in the etiology of irritable ulcer; the exposure of one of their filaments—either in the floor or at the edge of the ulcer—being an essential condition of its existence.

The rectum, especially its upper portion, possesses very little sensibility, as the chief nerve supply of this organ is found at its termination and around the anus, hence the fact that such grave diseases as cancer or ulceration may exist in the higher parts of the bowel and not manifest their presence by pain.

When a patient comes to a physician complaining of pain, such as has been described, which comes on shortly after defecation and lasts for varying periods of time, the presumption is strong that an irritable ulcer exists, no other rectal disease producing this characteristic distress. But in this, as in all other affections of this portion of the alimentary track, we must supplement our investigation by an actual exploration of the parts, in order to determine its true character and to exclude the presence of other co-existing lesions.

In the differential diagnosis one would think that the manifestations of this disease are so characteristic of the lesion that it would be almost impossible for an error to be made, and, yet, in a number of well-authenticated cases mistakes have been made, and patients suffering with this disease have been treated for neuralgia, uterine or bladder trouble, stricture, and even hemorrhoids.

Anal fissure is very easily distinguished from neuralgia, by the absence, in the latter affection, of any breach of surface. And by the characteristic pain which invariably follows alvine discharges, it is distinguishable from all other diseases of the mucous membrane of the rectum. In neuralgia, the pain caused by the pressure of the finger is not confined to one spot, as it is in fissure, but all the parts around the anus are alike tender.

One other condition of which special mention should be made, is that of the so-called "painful or vicious cicatrix," which now and then follows the clamp and cautery operation of the removal of hemorrhoids. I have seen but three such cases—, two of which were seen in consultation, and one occurred in my practice. The history is sufficient to clear up the diagnosis. In such instances, the same condition exists as in amputations, where a nerve is caught and held in the cicatrix of a stump. It is the cause of much suffering until relief is afforded by a dissection, which releases it. Special attention is called to these somewhat rare occurrences, for the treatment to be effective must be similar to that done when a vicious union has occurred in an amputated stump. An ordinary divulsion, which so happily cures the ordinary fissure will not cure these cases.

Writing this article, for a surgical journal, is sufficient reason for giving but scant notice to the non-operative methods of treating this disease. It suffices to state that when the sphincter muscles are hypertrophied to any extent, any treatment short of surgical is apt to be unsuccessful. The operative treatment, according to most authorities, involves a consideration of three methods:

(a) Divulsion.
(b) Incision.
(c) Divulsion and incision.

A divulsion, to accomplish satisfactory results, must be done under general anesthesia, and for some years I have resorted to the use of nitrous oxid gas and oxygen. With the anesthetic, given only by persons skilled in its administration, the patient is in a few seconds completely under its influence and remains so for the additional couple of minutes required for the operation. A point, worthy of note, is that under nitrous oxid anesthesia complete muscular relaxation is not encountered as in ether or chloroform anesthesia, so that the operator is better enabled to realize just how much force and time is required to satisfactorily divulse the sphincters.

In all cases, a sentinel pile, when present, should be removed, usually with a pair of curved scissors. Unless this is attended to and properly done, failure to cure the fissure will result. By being properly done, I mean no redundant skin should be left about the site of the fissure. The divulsion is accomplished in a manner known to all, by a careful and thorough kneading and stretching of the muscles with one or two fingers of each hand, or of the two thumbs introduced well into the bowel, back to back. By changing the position of the fingers or thumbs until the entire circumference of the bowel has been gone over, the sphincters finally will be felt to be quite soft and pliable. It is in this manner that I have cured the vast majority of patients I have seen afflicted with this disease and as I have never been obliged to resort to a second operation in the same case for a like trouble, I feel sure that no other evidence need be given of its merit. I mention this fact and desire to emphasize it for the reason that when the combined operation of divulsion and incision is attempted by other than a skilled proctologist there is great danger of the incision being made either too deeply or in a wrong direction. So that as a cure can be effected in the vast majority of cases without the incision, I think it is the safest proceeding for the rank and file of practitioners to follow.

The subsequent treatment does not require the patient's confinement to bed. The operation is usually performed in a dentist's office and the following day the patient may resume his usual vocation. He is instructed to keep the parts cleansed and after each stool to wash the anal region with a two per cent. creoline solution (a teaspoonful of creoline to a pint of water). Immediately after the operation if a sentinel pile has been removed, the wound is packed with gauze or cotton, over which a pad of similar material is placed and the dressing is kept in place by a T-bandage. The patient is seen daily for a week, then every other day for the ensuing week. Each treatment consists in washing the anal region with creoline solution and the insertion into the bowel of a ten per cent. ichthyol ointment applied on a dossile of cotton attached to the ordinary applicator which is left *in situ.* Should the parts feel sore after the operation, the patient is instructed to apply a hot-water bag, being careful to wrap it in flannel, so as to avoid a burn. The divulsion usually occasions more or less echymosis, but this never gives rise to trouble. In two weeks' time the patient is entirely recovered and is discharged from further observation.

In the operation by incision I believe the advocates of this method of cure usually employ a local anesthetic. The technique consists of the injection into the tissue around the base of the lesion of a solution of one-quarter to one-half per cent. of cocaine or novocaine until a sufficiently large area is infiltrated. The fissure is then curetted and any overlapping edges or sentinel pile trimmed away, after which one incision is made, starting at the upper end of the lesion and carrying it downward and at a right angle to the direction of the muscular fiber of the sphincters and dividing it well out into the skin. The deepest cut should be made at the lower edge of the fissure so that adequate drainage is provided to the part. A small strip of gauze is packed into the incision, and a compress and T-bandage complete the dressing. The after-treatment is similar to that detailed for a divulsion.

Formerly, it was the practice to sever the external sphincter in the operation for fissure, the supposition being that a more speedy cure was thereby accomplished owing to the muscular relaxation produced. Mr. P. Lockhart Mummery states that he believes that this is entirely erroneous, and that complete drainage is the only important factor. This authority adds that he personally thinks that the sphincter should never be cut more than is absolutely necessary to allow drainage, and in the majority of cases, he thinks it quite unnecessary to cut even the most superficial fibers of the muscle. I would be inclined to go a step farther, as borne out by my practical experience, and say, why cut at all?

The combined operation of divulsion and incision is simply a combination of the two operations described.

1610 Arch Street.

CATARRHAL PROCTITIS.

With a note on a Theory of the Cause of Hemorrhoids.

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The common form of proctitis is a simple catarrhal inflammation of the lower end of the intestinal canal. It is divided into the acute, atrophic and hypertrophic types.

The catarrhal diseases of the large intestine, classified as colitis, sigmoiditis and, lastly, those attacking the lower five or six inches of the alimentary canal, known as proctitis, are pathologically the same disease only situated at different portions of the large bowel.

The first step to a practical understanding of the etiology, diagnosis and treatment must be dependent upon our ability to reason the cause and effect of either of these forms of disease at any level of this tract. The cause may be the same for either a colitis, a sigmoiditis or a proctitis in many instances, but just why a particular area or portion is selected cannot be explained, unless there be a known physiological or anatomical weakness.

All of the alimentary canal may be affected by the same inflammatory process at the same period. Experience has taught me that the simple catarrhal inflammations show a tendency to extend downward while an extension upward seldom or never occurs.

It is hardly possible to decide as to the exact area which was originally affected when the disease has become a general inflammation of the entire colon and has resolved itself into a chronic catarrhal condition of any of these three portions of the bowel.

Because of their similar embryological origin, the catarrhal inflammations of the rectum find their analogues in those of the pharynx, and the comparison makes them easily recognized by the general practitioner of average experience.

If a working scheme, or classification, based upon our more intelligent knowledge of local conditions in the adult, could be devised, perhaps more could be accomplished in the treatment of these diseases when they occur in children and infants. The vulnerability of the child to any of these diseases seems to be even greater than the adult, when we consider the frequency of intestinal disorders in children.

Specific catarrhal inflammations of the colon, sigmoid and rectum represent different catarrhal inflammations which are the result of the introduction into the body, in various ways, of a specific organism. The avenues of entrance are, in some instances, fairly well understood, but, in others, our knowledge is meager and dependent upon the researches of the pathologists for further enlightenment.

The diseases which are classified as specific catarrhal inflammations are the tuberculous, dysenteric, gonorrheal, syphilitic and erysipelatous. Besides these, the intestine is liable to infection from nearly all the specific inflammations which affect the human body, dependent upon environment and hereditary influences.

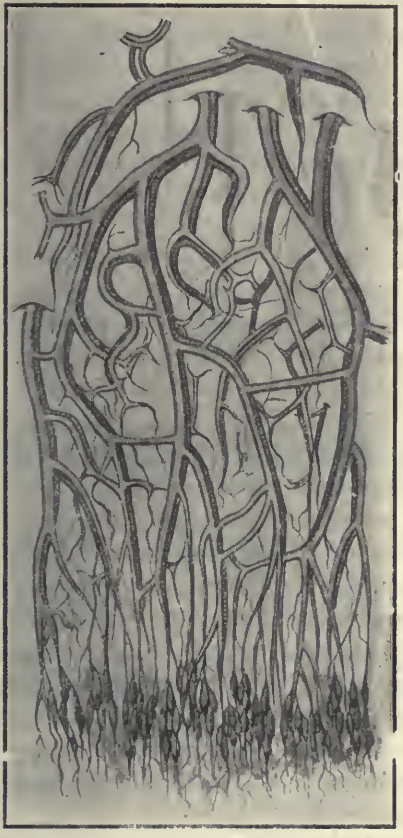

Fig. 1—Venous pools in which the internal hemorrhoidal plexus arises (Schematic.) (From Bodkin's *Diseases of the Rectum*, by courtesy of E. B. Treat & Co.)

Cases of acute catarrhal proctitis have demonstrated the following theory to me as a probable cause of hemorrhoids in many instances, and, taking into consideration the fact that no theory has been satisfactorily demonstrated by proofs, I have presumed to follow its dictates in the treatment of the majority of my patients where no other causative factor could be thought of as a suitable substitute. My observations have been that when acute catarrhal proctitis persists in the form of a low grade or subacute inflammation, hemorrhoids exist until the inflammation entirely disappears. Hemorrhoids due to this cause are most satisfactorily treated.

Miles, in a recent article published in the *Journal of the American Medical Association*, elaborately describes the arterial distribution in the hemorrhoidal mass after it has been found, and, in my judgment, he correctly outlines the relative position and the circulatory abnormalities arising within the disturbed mucous membrane, tumor or mass, but he does not present any tangible suggestion as to the cause or origin of hemorrhoids.

Again reverting to this theory of the origin of hemorrhoids from a catarrhal inflammation of the rectum, which is the most common sequel of the disease to take place, and sufficient irritability persisting to inflame the mucous membrane, a gradual hypertrophy is caused, followed by a separation and sliding down of a small portion inside of the loose cuff of mucous membrane within the grasp of the sphincter muscles. The mere weight of the redundant membrane is sufficient to initiate the loosening and result in the subsequent formation of a hemorrhoid. This small hemorrhoid is quickly filled by the serous exudate from the vessels lying within its submucous tissue. The upright superficial vessels of the lower rectum acted upon by the descending fecal mass, in a reverse direction to the normal blood current, tend to swell up these vessels, temporarily distorted from their engorged condition, tear more of the mucosa and submucosa from the surrounding tissue and are lifted gradually away from the muscular layer by the accumulating serum.

This condition, existing for months or years, repeatedly becomes edematous from irritation or traumatism in the form of hard fecal masses. The parts are constantly in a state of hyperemia. This increased blood supply causes a gradual hypertrophy of the bloodvessels and the connective tissue. Finally a well-organized hypertrophied mass becomes a recognized hemorrhoid. Hemorrhoids existing in the presence of an atrophic catarrhal proctitis are, in my judgment, secondary to this hypertrophic inflammation, and their presence is due simply to the serum which is forced within the meshes of the connective tissue of the submucosa, which, with the bloodvessels, remains hypertrophied, the atrophy only affecting the mucous membrane higher up.

In order to understand the relative potency of a catarrhal proctitis in the causation of hemorrhoids, it should be borne in mind that indigestion or a disturbed digestive tract seems to be always associated with hemorrhoids. We may also find other well-known and positive causes of hemorrhoids, viz., disease of the liver, the kidneys, or the pancreas, heart lesions, traumatisms, diseases of the adjacent organs, specific forms of catarrhal proctitis, and malignant diseases.

The large number of cases of hemorrhoids associated with proctitis presented for treatment positively refutes the assertion that every one suffering from hemorrhoids, also suffers from one of these serious diseases.

Acute catarrhal proctitis follows the course of catarrhal inflammation in general and is dependent upon idiosyncrasies, habits, environments, hereditary influences, etc. The disease may begin in the rectum or from any portion of the upper bowel, and, therefore, necessitates frequently the treatment of the entire intestinal canal.

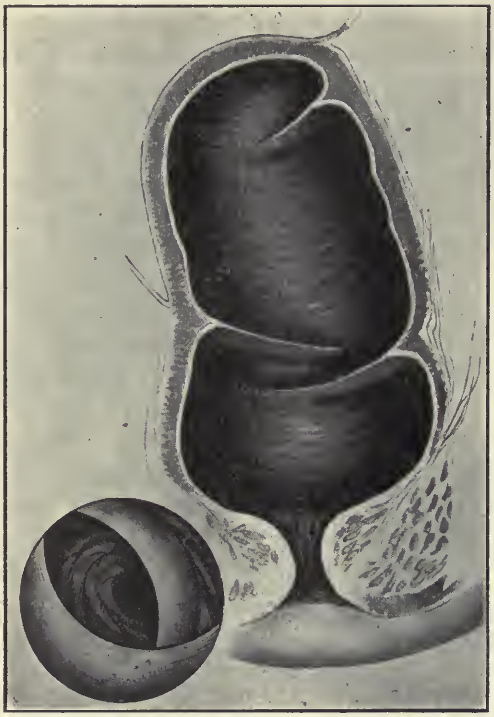

Fig. 2—Drawing showing the usual location of Houston's valves and the relative sizes of rectum and anal canal. Insert—valves as seen through the proctoscope. (From Bodkin's *Diseases of the Rectum*, by courtesy of E. B. Treat & Co.)

Etiology. Attacks of acute indigestion are very often associated with acute proctitis in a mild form. Rheumatism is probably a factor in its causation, polypi, adenomata, villous growths, papillomata and various other growths which may be the underlying cause of periodic exacerbations of the catarrhal inflammation in the rectum and sigmoid. Intestinal parasites, foreign bodies, impacted feces, exposure to cold, prolapse of the rectum, drugs, such as arsenic or corrosive sublimate, and intussusception are common causes.

Symptoms. Acute catarrhal proctitis is a sudden inflammatory process, varying in degree as to severity and cause. It is sometimes accompanied by a chill and rise in temperature at the onset, with a coated tongue, headache, a feeling of fullness, heat and weight in the rectum, tenesmus, bearing-down and a desire to micturate. This condition causes the sufferer to imagine there is a foreign body in the rectum, and he tries to dislodge it by frequent attempts at stool, which cause protrusion of the mucous membrane in the form of edematous hemorrhoids. The mucous membrane becomes swollen, and the caliber of the rectum is thereby decreased. The patient seeks the recumbent position, rather than walking about. At first there is a discharge of the fluid feces; later this becomes bloody, mixed with mucus. If the inflammation continues uncontrolled, ulceration and sloughing may follow with the addition of pus.

These attacks generally follow only the ordinary course of a simple catarrhal inflammation and subside within seven or eight days; or they may become chronic with an indefinite period of invalidism.

Chronic hypertrophic catarrhal proctitis is almost constantly associated with a similar involvement of the intestinal tract higher up and seldom appears only as a proctitis. Ordinarily, the rectum will remain the same as regards structural changes in the muscular wall and mucous membrane, or the mucous membrane may be slightly thickened. There may be small abrasions or excoriations due to the ease with which the membrane may be injured from hardened feces, or on the introduction of the proctoscope. Ulceration is found only in the severe forms. The mucous membrane presents the appearance noted in the pharynx with the same form of catarrhal inflammation. It is swollen, red and with occasional bloody points. The lumen of the rectum may be narrowed, caused by the overproduction of tissue and swollen glandular apparatus.

This type of inflammation of the rectum is almost always the forerunner of the atrophic form, in which it often terminates.

Atrophic catarrhal inflammation of the rectum is also part of a general diseased condition of the entire colon and is the final phase of the chronic congestion in the form of a chronic hypertrophic catarrhal inflammatory process which has preceded it for many months or years. The rectal mucous membrane is thinned out, almost transparent, and so much denuded of its glandular elements as in some cases to make plainly visible the underlying network of vessels and arteries, with an occasional area left bare. This denudation of the epithelium progresses so far that these areas resemble small ulcers, and it results from a long-continued chronic atrophic inflammatory process. The mucous membrane often looks granular, with portions which are more or less congested and bossellated during the transitional stage, from the hypertrophic inflammation. The air pressure used with the pneumatic proctoscope will be sufficient to almost burst the bowel and will balloon the whole cavity so greatly as to make the passage of the sigmoidoscope more difficult than with the hypertrophic variety, which, being heavier, holds the contour much better and assists in finding the course of the bowel lumen above. The surface is dry, maybe rough, or glistening smooth, inelastic, and, as mentioned above, very light in weight.

290 Clinton Avenue.

SYPHILIS, TUBERCULOSIS AND CANCER OF THE RECTUM.

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I am led to discuss this rather comprehensive subject in a brief way, because these three diseases occur frequently, are often confused, and give rise to dire results, where, by reason of their insidious onset, they are recognized too late to afford permanent relief.

In no measure will an attempt be made to more than touch upon the salient features, with the hope to stimulate greater effort on the part of the profession to at least make an examination of the rectum and anal canal by sight, touch and instrument, in every case of pelvic distress, or obscure intestinal symptoms. It is alone by these means can one hope to prevent the unhappy development of these diseases. Early recognition is the essential element for successful management.

While such an examination may not at once disclose which particular malady is present, it will indicate that a serious condition exists, whose character may be determined, in most instances by a microscopic examination of the scrapings, or section of the growth. I hope, however, to be able to here indicate the characteristics of each of this triad, that a reasonably certain differentiation can be obtained.

The repetition of a call for rectal examination perhaps may seem a reflection upon professional efficiency, but there are still many men in general practice as well as general surgeons who yet feel that this is not needed. I have repeatedly had patients referred to me who have been operated for hemorrhoids with a cancerous mass a few centimeters above the anal orifice, patients with unrecognized stricture that have gone on to almost complete closure, who had been on more than one occasion cut for fistulæ, patients with ulcerative proctitis who had been medicated for diarrhea over a long period, without examination. Many instances can be cited where an examination would have made early relief possible.

The examination is not difficult, it does not require any great outlay for instruments, it is not more disagreeable than others that needs must be. First of all, no examination of the rectum is complete without a proctoscopic, or even a sigmoidoscopic examination which can be made by a simple tubular sigmoidoscope, a head light and the knee-chest position. The latter is necessary when the pneumatic instrument is not used as in this position the bowel is distended by the inrush of air as soon as the anal orifice is dilated.

The most frequent diseases of the rectum and anus are probably fistulæ and hemorrhoids; but the most serious and by no means rare affections are tuberculosis, syphilis and cancer. These occur much oftener than many realize and, certainly, they are very destructive and often fatal.

The recognition of these diseases is not difficult, and their differentiation one from the other is comparatively simple. In two of them the demonstrable causative organism is present, and it is only very infrequently that one is not able to isolate the specific organism in tuberculous or syphilitic lesion. All three diseases begin as a localized lesion, as a tumor formation, or an as ulceration.

With the tubercle the true beginning is usually so slight and insignificant as not to be easily recognized, while with syphilis its start is so insidious that it can well be assigned to any precise time.

Cancer, on the other hand, is definitely localized and its origin and beginning can be seen and felt.

The usual description of the lesions of the three at the period of their devolepment, as ordinarily given, is that of the disease when complicated by septic infection—the blood, the pus, the stench which are all a result of this infection and not of the growths themselves. Of this secondary infection most of the complications are a resultant.

The early eradication by excision of the point of invasion is comparative in these diseases. Syphilis is disseminated so quickly throughout the entire system, that excision of the local lesion is practically valueless. Tuberculosis, which but rarely occurs in the rectum as a primary lesion, could be removed by excision in most cases, if such lession exists as a primary one. Cancer removal and cure is altogether a matter of eradication by complete excision, and the number of permanent cures will be in proportion to the number of cases operated upon soon after their inception or, better yet—to make a statement incongruous, yet essentially true—before the cancer becomes a cancer—that is in the precancerous state.

The wide-spreading of syphilis being so rapid and so early after its invasion, is doubtless due to the inability of the lymph glands to offer resistance to the spirochæte, while to the bacillus of tuberculosis the glands do offer slight resistance, accounting for its less rapid extension; but as this resistance is not strong, invasion is not long prevented.

However, there is great resistance to the causative factor of cancer whatever that may be, which accounts for the rarity of involvment of other organs until late in the disease.

The effect upon the glands of the syphilitic organism is what one would expect—with the rapid passage of the organism through them. There is enlargement and hardening, first involving those nearest the lesion but eventually affecting nearly all the glands of the body with practically none suppurating. With tuberculosis the neighboring glands enlarge, and frequently one after the other suppurate.

In cancer, the glands become hard and resistant like small tumors easily palpable in the accessible areas, but they rarely suppurate.

The anatomical arrangement of tissues, divide the anal from the rectal areas, in blood, nerve and lymphatics, with marked distinctness; so that an involvement in one or the other region will drain through its own lymphatics.

The glands of the anal region are in the groin, and an enlargement of them, when no genito-urinary condition is present, is practically always due to some anal lesion.

The unreachable glands of the sacrum and mesentery are the filters for the rectal canal, making it impossible to get a correct idea of their condition until revealed at operation. In cancer a radical and extensive operation is thus imperative.

The anal region being well supplied with sensory nerves, pain is more evident earlier, and more potent, than in the rectum proper where the absence of sensory nerves accounts for the lack of pain until the growth is so extensive as to involve the peritoneum or produce obstruction.

These three diseases present themselves in the form either of an ulcer or a tumor and possess very well marked characteristics. Their appearance in individuals seem in a general way to occur at rather definite age periods. Tuberculosis occurs more often in the young, spyhilis in middle life, and cancer in later life.

The tuberculous individual is usually thin, pasty in appearance and anemic, but may be fat; the spyhilitic individual is ordinarily dry in appearance, and old-looking for his age. At its inception cancer is most often present in the florid, robust looking patient.

Ulceration is the earliest development in rectal tuberculosis. In syphilis either ulceration or tumor (gumma) may appear early; if the latter it breaks down and ulcerates; with cancer, tumor is always the primary, and ulceration the latest manifestation.

The ulceration of tuberculosis begins as a small denuded area, with tendency to destruction, ordinarily an elevated center, and grayish color, with extending margins which undermine the mucosa. These ulcers enlarge peripherally and often coalesce, giving a wide ragged boundary, following the line of blood- and lymph-vessels; in the lower rectum this prolongation is irregular in all directions; in the upper rectum ulceration progresses parallel to the lumen, while in the sigmoid the tendency is to encircle the gut.

If there is an excess of cell growth, with greater destruction and disentegration than of growth of fibrous tissue, the ulceration grows in depth and surface to annihilation of the mucosa, submucosa and even the muscles, and may cause perforation; contrariwise should fibrosis take place, which is the only way of healing in this or the other two-mentioned diseases, a stricture may form, which is an exceedingly rare and doubtful outcome.

A point of differentiation rests also on the fact that tuberculous ulceration of the rectum but rarely occurs as a primary invasion but is usualy secondary to a lesion elsewhere in the body. There is the rare form of rectal tuberculosis of which very few cases have been reported, hyperplastic tuberculosis, an infiltration of the intestinal wall. It occurs as a formation of fibrous hyperplasia and granulation, instead of necrosis and ulceration. Involving especially the submucosa and circular muscle layer it gives a marked rigidity to the tube, and a feel not unlike a scirrhus cancer—with which it has been confused and submitted to operation. It is in this form that one may claim for tuberculosis a local if not primary involvement.

It is rare for the primary lesion of syphilis to occur in the rectum. Syphilitic ulceration is the manifestation of the secondary syphilides or of breaking down of small gummata beginning as a small crater-like sores, with well defined, hard, indurated edges, and extending along the lines of the lymph channels. In the rectum they occur usually near the anal orifice. Ordinarily they give but slight discomfort and are therefore not seen early as simple ulcerations but, more often, when they have developed an extensive area of necrotic destruction, with large quantities of pus and blood discharging and causing irritation about the anal orifice. The result of this is the formation of cock's comb tags that may almost be regarded as pathognomonic of syphilis.

The ulcers of cancer appear secondarily to the tumor, as roughened, denuded cracks or fissures, usually on the edge of the tumors. They are secondary infections leading to fatal damage in advancing cases.

Thus there are one of two courses which each of these diseases may follow. They either go on to great tissue involvement and devastation with the usual unhappy end; or, if checked by nature's cure, fibrosis and scar formation develop, which is the usual course in syphilis, the unusual in tuberculosis and the very rare in cancer. The greatest tendency of all is to break down and extend by their own inherent qualities, aided secondarily by infection.

The quality of contraction in fibrous tissue accounts for the stricturing and obstruction of the gut. Where fibrosis takes place in syphilis, tuberculosis or scirrhus cancer, there are enormous formations, largely fibromatoses. An example of such fibromatoses is the keloid of the skin, particularly in the negro. This tendency to fibromatosis in the negro may account for the frequency of the rectal stricture in the negro, for syphilitic strictures are very uncommon in the white race.

The progress of cancer is favorable in proportion to the amount of fibrous tissue, and the earliness of removal, *i. e.*, while it may be regarded as a localized disease. The prognosis of tuberculosis of the rectum is very unfavorable, as its constitutional involvement is early. The treatment may be local for the destruction of invading organisms, but the general treatment of tuberculosis is the only hope.

Syphilis is from its beginning a constitutional disease, and its cure can be accomplished by suitable anti-syphilitic treatment administered early in proper manner and over a sufficiently long time. Syphilis can be cured, but the complications, such as stricture, are difficult to deal with and should be prevented by early recognition of the disease.

It has not been my intention to deal with this subject more than in a general way. It would make this contribution too long to go into in full detail, but it has seemed worth while to emphasize the facts as above mentioned. The complications often resulting in these three diseases are the effects of secondary infections, which are to be described as the characteristics of the diseases in their more advanced stage. They make differentiation more difficult, and especially is this true when, as occasionally happens, one encounters two of these three affections at the same time in the same individual.

The most frequent symptoms aside from general discomfort and pelvic ill ease, are hemorrhage, then morning diarrhea and discharge of pus.

To summarize:—The three diseases can be recognized early and differentiated. Tuberculosis is rarely a primary disease of the rectum; it occurs late secondarily and its cure is exceptional. Syphilis occurs as a spyhilide or gumma, its early constitutional treatment prevents complications and is curative. Cancer occurring in the rectum can be seen in 65 per cent. of intestinal cancers by the sigmoidoscope, and its early removal is the only hope for successful treatment.

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STRICTURE OF THE RECTUM.

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Strictures of the rectum are spoken of as annular, tubular and linear, according to the shape which they take. The annular stricture is one which assumes the shape of a ring, involving only a very small extent of the rectum, but completely surrounding it. The tubular stricture, sometimes called canular, consists in a tube-like constriction of the rectum that extends for an inch or more in length, in which the entire circumference takes part. Linear stricture consist of cicatricial or fibrous deposit over a limited area in the circumference of the intestine, by which the caliber of the latter is lessened either through the dimensions of the deposit itself or through the contractions of the walls of the gut over the area which it occupies. According to their etiology strictures are divided into congenital, traumatic, tuberculous, neoplastic, syphilitic, gonorrheal, dysenteric and inflammatory.

Stricture of Large Caliber.—Every surgeon in familiar with the period when it was the custom to introduce an ordinary steel sound of very moderate size into the urethra, and if it passed without absolute obstruction, pronounce the patient free of stricture. Later on cases arose with symptoms referable to the urethra in which the ordinary methods of examination failed to reveal any condition to account for them. The discovery of this condition led to new and revised methods of treatment, and consequent cure of many cases which hitherto had baffled the efforts of surgery. The same condition exists in the rectum.

Small cicatricial or connective tissue deposits in the walls of such canals as the urethra and the rectum are constant sources of irritation because of the friction produced by the passage of urine or fecal matter over them. It is not necessary that the caliber of a canal shall be so constricted as to form an obstruction in order to produce irritative symptoms. Obstructions to fecal passages from pressure by pelvic tumors, pessaries, etc., outside of the rectal wall, can not properly be called strictures of the rectum, but they produce similar symptoms and may excite an inflammation in the walls which will eventually produce stricture.

Spasmodic Strictures:—Under this term two conditions have been described which are entirely dissimilar. In one there is a contraction with no organic change in the gut; it consists in spasmodic contraction of the muscle without any actual shortening. In the other, a condition is described in which organic change and permanent constriction of the tube is produced through persistent spasmodic contraction resulting in shortening and fibrous transformation of the muscular fibers involved. While spasm of the esophagus and urethra are admitted, the existence of a purely spasmodic stricture of the rectum has been denied almost universally. It is admitted, however, that a small rectal bougie may be successfully passed one day and the next time an attempt to pass it may result in absolute failure; this is due to the bougie being arrested by a fold of mucous membrane or the promontory of the sacrum, which is likely to convince the inexperienced surgeon of the existence of such a stricture.

Inflammatory Strictures:—These include all that are due to simple, tuberculous or syphilitic inflammations. The simple comprises diffuse inflammatory, cicatricial and perirectal.

Location:—The site of this class of contractions varies greatly. They may occur at any point from the margin of the anus to the upper limits of the pelvic colon, though the large majority begin within the first six centimeters (2½ inches) of anus. Of 110 cases collected by the late Dr. Tuttle of New York, he found the following: Below 6 centimeters, 65; at 6 centimeters, 5; from 6 to 9 centimeters, 18; above 9 centimeters, 12; in the pelvic colon, 10. In this collection there occurred no less than 8 syphilitic and 4 tuberculous strictures above 9 centimeters. There is no question, however, that the majority of strictures of these parts are within the first 8 centimeters of the anus. Cicatricial stricture is one of the complications or unfortunate sequences of operation for excision or resection of the rectum by either the sacral or perineal methods. Especially is this likely to occur if end-to-end union is attempted in the region surrounded by levator muscle. Operations for fistula and hemorrhoids have resulted in the same condition. Recently, owing to faulty Whitehead operations, more strictures are seen than formerly. In conversation with the rectal surgeons it has been my good fortune to meet, I have found that the opinion generally as to operations for hemorrhoids agree that the Whitehead should be done only on selected cases; and the best results, though perhaps not so classical, have been obtained with the other recognized methods, especially in the hands of the general surgeon.

Tuberculous Stricture:—The existence of tuberculous stricture has been often denied. Pathological examinations have positively demonstrated not only the inflammatory results of tuberculous ulcerations, but the presence of giant cells and tubercle bacilli in the structure itself. At this point I would call attention to a mistake so likely to occur in making a diagnosis from the bacilli, and that is the characteristics of the hay, smegma and tubercle bacilli. They are not always as easily differentiated as it is claimed, even with the acid-fast method. That tuberculous ulcerations of the rectum are so rarely primary, and that when they occur in cases which have already developed the constitutional disease they seldom heal, have led many to suppose that tuberculous stricture is impossible.

Syphilitic Stricture:—For many years a controversial war has been waged concerning the influence of syphilis in the production of rectal stricture. Many of the early writers, as Morgagni, White and Talman, failed to mention it, while others, as Bush, Copeland and Curling, absolutely denied its etiological significance. As experience widened and observation became more exact, it gradually became established that a large number of patients suffering with stricture of the rectum had been the victims of syphilis, or at least of "venereal disease." The field of controversy then changed. Surgeons were still unwilling, however, to concede that the lesion developed through a constitutional process.

Diagnosis:—It is not only necessary to determine the existence of stricture, but also its seat, pathological character, extent and degree of constriction; when within four inches of the anus, all of this can be learned with comparative ease, inasmuch as the parts can be reached with the finger, can be seen through the speculum, and sections can be thus obtained for microscopical examination. The history of the case will give valuable information as to existance, and probable pathological character. Previous injury or operation, diffuse proctitis, pelvic cellulitis, prolonged labor, the history of perirectal or pelvi-rectal abscess, syphilis, fistula or rectal ulceration, may suggest a stricture especially if associated with increasing difficulty in bowel movements.

Examination:—The patient should be placed upon his side, with hips flexed upon the abdomen and elevated upon pillows. When there is a discharge from the parts the character and odor should be carefully observed. In cancer it is unique; "once smelled it is never forgotten; it is neither fecal or feculent, but a combination of putrefaction, gangrene, decomposing feces, and rottenness to which no other bears any resemblance" (Tuttle). The chief source of information in a diagnosis of stricture, is your finger. Great gentleness and caution should be exercised, not only to avoid giving pain which will cause spasm of the sphincter, but because one may break down tissue and cause dangerous hemorrhage or perforation into the peritoneal cavity. If hard and nodular and broken-down in its center, forming an irregular crater-like ulceration, one may feel with no little degree of confidence that he has a malignant disease to deal with. On the other hand, if the obstruction is comparatively smooth with only a few irregularities beneath the mucous membrane, if it is movable upon the sacrum and surrounding tissues and apparently confined to the walls of the gut, it will probably belong to the inflammatory variety. When the symptoms indicate stricture, and it can not be made out by digital examination, search by instruments will often succeed, but it must be borne in mind that it is exceedingly dangerous. A bougie, however soft, may do great damage, there are so many sources of error that little weight can be attached to it as a diagnostic aid. It may be caught in a fold of mucous membrane or a diverticulum and absolutely fail to pass this. At the promontory of the sacrum it may be arrested, owing to the acute flexure of the sigmoid, and double upon itself coming back into the ampulla instead of passing up into the sigmoid. Tuttle's method is perhaps the safest and best. It consists in passing the proctoscope up to the strictural opening and then passing the bougie through it. In the majority of cases where diagnosis is not easily made, I personally believe it much safer to perform an exploratory laparotomy than to subject the patient to too much instrumental examination in diseased conditions in this region.

In making such explanatory examination the incision should always be similar to that employed in inguinal colostomy in order that an artificial anus may be made at the time if necessary; also, this incision will be found most useful in operations around the sigmoid.

I recall a very interesting case seen some years ago while working under the direction of Dr. Tuttle at the New York Polyclinic Hospital, and shall briefly state his management at that time. The case was one of specific stricture of the rectum, and the treatment anticipated was as follows: He performed a Maydl-Reclus colostomy in the transverse colon, in order first, to treat the ulcerations and infected area locally and, second, so he would have sufficient gut above the stricture to perform a perineal extirpation later and bring down healthy intestine from the upper sigmoid for a new permanent anus; then later he closed the artificial anus in the transverse colon, and his patient should have a perfect result. The period of time required for these operations would cover not less than nine months. A subsequent letter from Dr. Tuttle told of his successful results in this case.

Treatment:—Recognizing the fact that strictures are all due to inflammatory process, it is conceivable that proper treatment in the early stages may prevent their formation. The theory upon which gradual dilatation has succeeded in curing a certain number of strictures of the urethra is that it squeezes the blood out of the strictured area, and when the instrument is withdrawn there results a state of arterial hyperemia which results in absorption of the newly formed tissues. During the early stages of stricture the bloodvessels remain intact, and are not materially diminished in number, the plastic deposit is soft and absorbable. Similar treatment here may be as successful as in the urethra, and careful antiseptic treatment may often prevent a cicatrix.

If the stricture is ulcerated or infected, one should always treat it locally through the proctoscope before attempting operation, or if one intends treating it by dilating with bougies local applications are most valuable. As to the various preparations used in the applications, it is a matter of one's choice; those with which I personally have had the best results from as local treatment for ulceration are, ichthyol, 10% in glycerine; silver nitrate solution, 3% to 5%, and tincture of iodine, 10% in glycerine. After the condition clears, I begin with gradual dilatation with Wale's bougies never more than three sizes at a visit, and always at intervals of two to three days. Attention is especially called to the importance of not making the patient miserable and disheartened by too frequent and vigorous treatment at the beginning.

Method of Treatment:—The patient should be placed on a nourishing but non-irritating diet, preferably nitrogenous, and here again attention is called to the too frequent milk diet, which is often far from being harmless in these conditions. A milk diet produces a hard stool; while not irritating in the stomach and upper intestine, it is far from so in the sigmoid and rectum, and is especially to be avoided in stricture. With the nitrogenous diet, a liberal amount of cod liver oil or olive oil should be given. Rest in bed should be insisted upon, but not to the point of producing debility from the lack of exercise.

Mild laxatives are sometimes indicated, and purgatives are to be absolutely prohibited as they are so irritating, and may produce a marked edema. Kelsey states that acute obstruction sometimes occurs in these cases, and he has been able to get a movement of the bowels in cases of stricture with apparent obstruction by the administration of a moderately large dose of opium.

Local and Operative Treatment:—The chief local and operative treatment in strictures are: dilatation or divulsion, proctotomy, excision and enteroanastomosis, colostomy and electrolysis. Theoretically the ulceration should be healed before surgical treatment is instituted in order to avoid sepsis, but practically this is impossible, for in many cases the ulceration can not be cured so long as the stricture exists. Gradual dilation is the method used throughout the world of surgery, notwithstanding that it is seldom if ever curative, and entails periodical visits and treatment through life. It is carried on by the use of bougies and rectal dilators, and requires skill and good surgical judgment and is not without danger in the hands of the most skillful. There are various methods of introducing the bougie, and I shall call attention to only one of them which I have been using for four years:

Tuttle's Method of Introduction:—In order to obviate the dangers referred to, Tuttle for several years previous to his death, had been in the habit of introducing a proctoscope up to the point of stricture and locating the end over the aperture; the bougie is then gently passed into the stricture, and is known to be in the proper place and not caught up in a fold or invaginated portion of the mucous folds of the gut wall. At first it may be advisable to introduce it every day, provided the patient's rectum and anus does not become inflamed and tender from the frequency of this introduction. This method is simple, accurate and practical and far superior to the old and uncertain methods. One should never introduce more than three bougies at one sitting, and he should always keep a record of the size and time the bougie remained in the stricture at the previous visit. Before removing the last bougie for that day, a warm solution of boric acid should be introduced through the bougie, which brings away everything above the strictured area when the bougie is withdrawn. The patient should be kept quiet after the treatment for at least a half hour, and if there is any bleeding upon the withdrawal of the instrument, it should be immediately introduced again to see the seriousness of such hemorrhage, for he should not be allowed to leave the office until all doubt is dispelled.

For the other various treatments, as proctotomy, partial and complete, the reader is referred to the text-books for this method, as description of the technique alone—which is so important—would take up much valuable space in this brief article. After the ulceration and suppuration have been controlled, and it is found that the stricture persists, resection may be done without so much danger of infection, and with a greater probability of immediate union of the sutured ends. In brief, a temporary artificial anus with gradual dilatation and local treatment and, if necessary and practicable, the eventual resection of the stricture, seem to furnish the most rational and safest method of treatment.

During the past few years I have had several cases of stricture following the Whitehead operation for hemorrhoids and the tedious task of endeavoring to offer some relief to those miserable persons has made me most antagonistic to the classical operation. Some years ago while working with the late Dr. Tuttle in New York, I had the opportunity to become quite intimate with one of his patients from the Pacific coast, who told me that he had been the victim of stricture for many years, had visited the best known surgeons in many localities and spent thousands of dollars in trying to get some degree of comfort, and that he had received more comfort by remaining in New York for one year and being treated by Dr. Tuttle with the bougie about twice a week, than any other method he had ever tried. In my own practice I have had some very pleasing results with this method of treatment, but only in those cases in which I could impress the patient with the fact that it would be a long-drawn-out process, requiring hearty cooperation and persistence in regular visits at intervals suggested by the progress of each individual case.

In June, 1917, Mrs. Mary M., age 42 years, presented herself at the clinic. She was operated upon for hemorrhoids several years before and since that time she had undergone five separate operations for stricture of the anus. Examination revealed a smooth stricture of the rectum about one inch from the anal margin which would not admit an ordinary lead pencil, and the bowels would move only after taking a drastic purgative. There was present a laceration extending into the rectum from the birth of her last child, and the perineum was one glazed surface of scar tissue. After some persuasion she consented to another operation, and with the assistance of Dr. Willse to direct my work in repair of the gynecological condition (Babcock operation) with which I was not familiar, a resection of about three inches of bowel was performed and the bowel brought down to the skin margin. The sphincter having been destroyed at one of the previous operations we attempted to make an artificial sphincter by the following method: Modified Chetwood operation, hanging the rectum in a small strip of gluteous maximus from the opposite sides, and further inducing sphincteric action by deep buried silk sutures through the levator ani on each side to the lateral bowel wall. The perineal and muco-cutaneous sutures were of chromicized catgut. Because the patient had a very profuse vaginal discharge from her old tear, we found that a number of sutures in the perineum broke out in about four or five days. The patient made an uneventful recovery and in about four weeks from the time of leaving the hospital she presented herself at the clinic with surprisingly good control of the bowels, and upon introducing the finger into the anus she could voluntarily close down upon the finger to an appreciable degree. I had the pleasure of seeing this patient on December 16th, 1919, in order to report my results, and she tells me that she has perfect control except when on several occasions her bowels have become very loose from some indiscretion in diet, and this would last for only a day or so in summer time. She has gained in weight and seems to be in perfect health.

30 East Preston Street.

A well-developed prolapse of the rectum is one of the most difficult problems in surgery. A minor prolapse, not involving the peritoneum, may be quite curable, however, by circumferential resection of the protruding segment.

ASEPTIC AMPUTATION OF THE RECTUM*

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In presenting briefly the following modification of amputation of the rectum as usually practised, I do not wish to give the impression that I am describing an entirely new procedure. Before the New York Surgical Society some years ago (*Annals of Surgery*, Vol. 66, p. 241) I showed several cases in which I carried out the technic about to be described. The great advantage that I see in this technic is in the rapid healing of the large wound made by the excision of the rectum and lower sigmoid. By this method patients can be discharged from the hospital with the wound closed in a relatively short time and it is to call attention to this that I am again presenting the subject.

The first step in the operation, the patient's intestines having been thoroughly cleaned by two courses of castor oil, is to shut off by suture the anal opening. With a separate set of instruments a skin flap is turned up all around the circumference of the anus, and with a heavy silk suture this circular skin flap is sewed together so as to prevent any leakage of the intestinal contents during subsequent manipulations. This area is then well painted with iodine and covered with a towel. After putting on fresh gown and gloves, with fresh instruments the surgeon then exposes the rectum with an incision well above the peri-anal denudation and running up a little to the left of the median line. The coccyx is removed in the usual way and the rectum is liberated well above the growth. Douglas' pouch is opened and the sigmoid is drawn down as far as necessary, and after sufficient of the sigmoid has been liberated to warrant the surgeon in believing that he is far above the growth and the glandular involvement, the peritoneum is closed at the new level on the sigmoid. Then the skin incision is continued down to either side of the anus meeting the denuded area which was made preliminary to the closure of the anus. After liberating the anus from all its attachments, the rectum, sigmoid, and anus unopened, are thrown over on the patient's sacrolumbar region. The levator and muscles are united to make a firm pelvic floor and a tube is inserted in the most dependent part of the wound where the anus originally was. Skin stitches are inserted and a small packing introduced up to, or close to, the suture line at Douglas' pouch. With a heavy silk ligature, the protruding gut is tied off about one-half inch from the level of the closed skin and a clamp is placed across the bowel about one inch distal to the ligature. The intestine is sutured to the skin without entering its lumen so as to attach the gut at the new position (artificial anus.) A small packing is inserted above the new position of the gut. The whole wound is then dressed, the gut still being attached. After a petrolatum dressing is applied to the large wound, with the cautery a section of the bowel is made between the ligature and the clamp. In this way you will see the lumen of the bowel has not been opened until after the wound has been sutured and dressed. The ligature is allowed to remain in place until the patient complains of distention or becomes distressed by cramp-like pains. Then the ligature is opened and a rectal tube is introduced well into the bowel and held in place by a purse-string suture, which tube continues to protect the wound, now well on the high road to complete healing, from contamination by feces.

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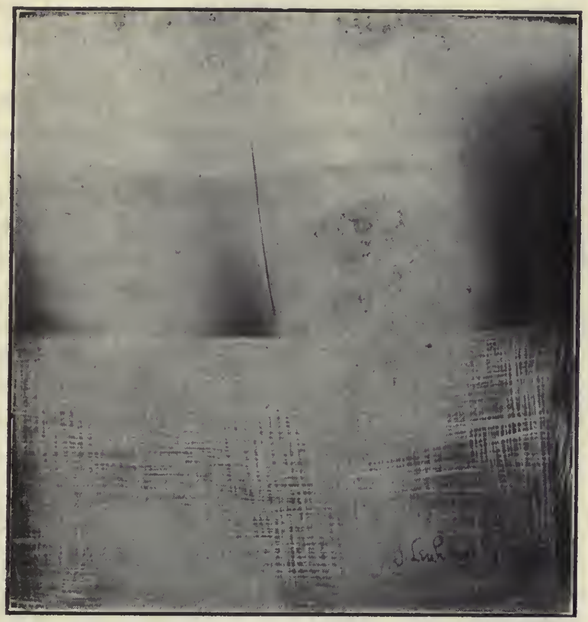
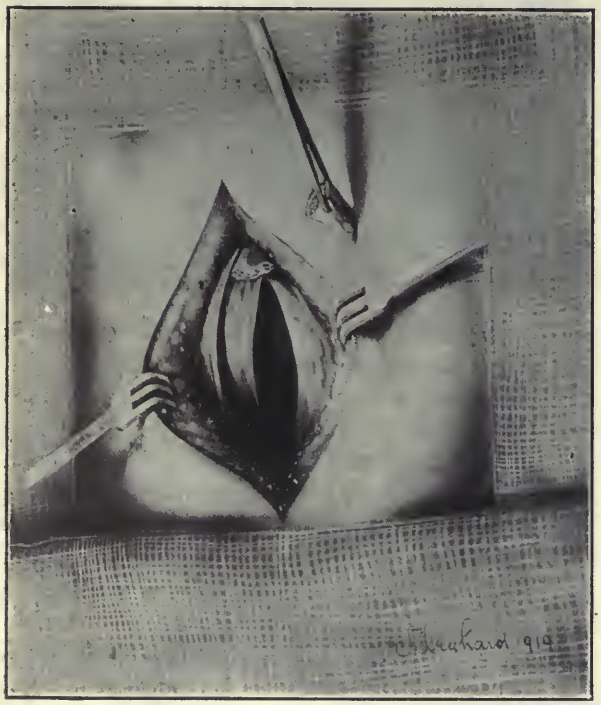
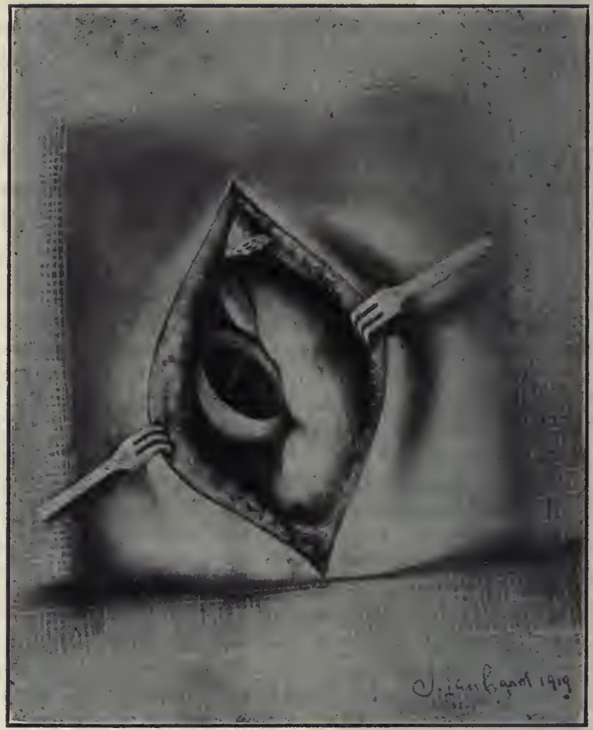
*Read before the Surgical Section, N. Y. Academy of Medicine, November, 1919.

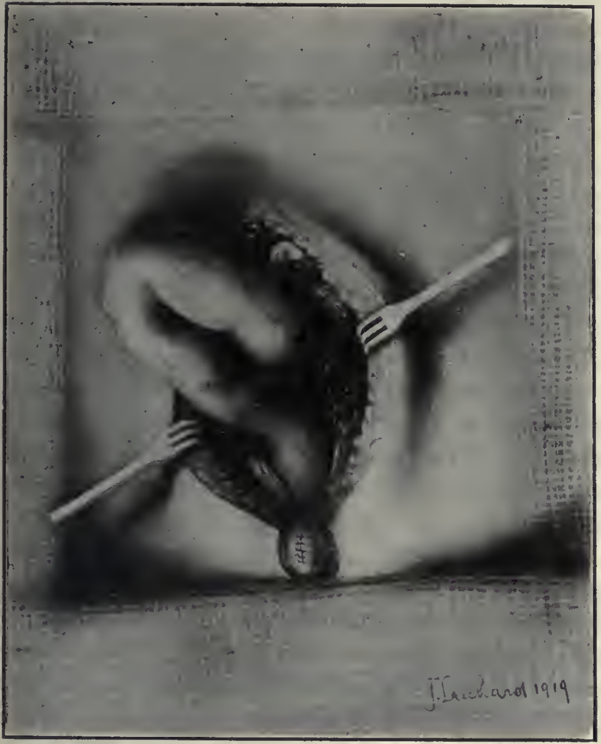




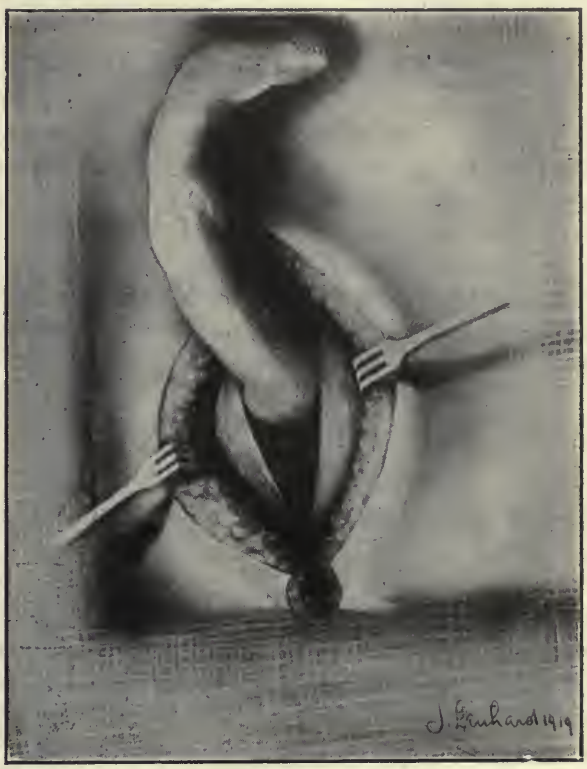


The following cases illustrate the result obtained by this technic:

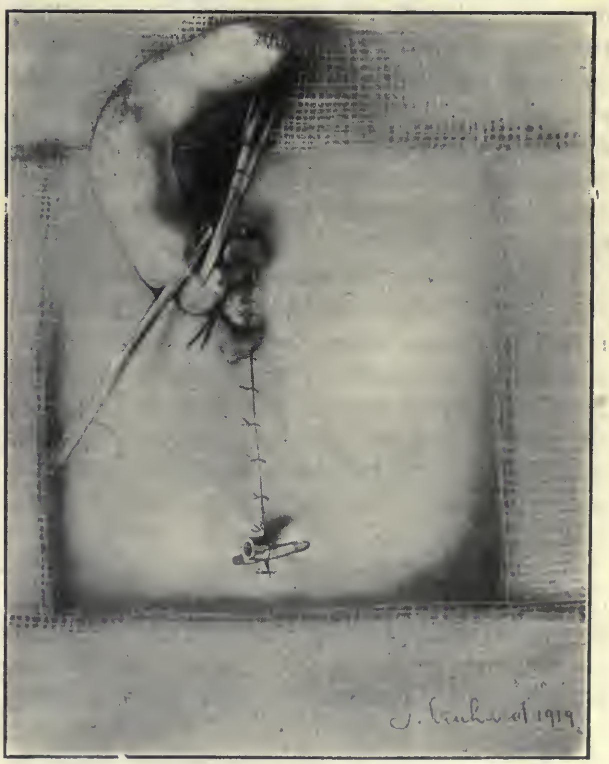
Case I. Mrs. A., 52 years of age, admitted for strangulated femoral hernia December 21, 1915. On examination of her rectum for hemorrhoids, an extensive carcinoma of the anterior wall, involving the wall of the vagina was discovered. On January 5, 1916, four years ago, an aseptic amputation of the bowel was performed as described above, together with excision of the posterior vaginal wall. The patient did not suffer from ligation of the bowel until 48 hours had elapsed, when the ligature was opened and the tube tied in place. Owing to the fact that the whole posterior wall of the vagina as well as a large piece of the sigmoid, together with the rectum had been removed, the patient was kept in bed for twenty-four days. During that time the wound rapidly healed, and she was discharged from the hospital practically healed on February 12, 1916, thirty-eight days after operation. The patient was examined in November, 1919, and found to be free from recurrence.



Case II. Mrs. B. H., 52 years of age, suffered from practically the same condition as the above patient, having an adeno-carcinoma of the rectum with involvement of the posterior vaginal wall. A similar extensive operation was done on this patient on January 13, 1917. This patient tolerated the ligature on the intestine for four days, when the tube was inserted. On the thirteenth day the patient was out of bed with the wound practically healed. She was discharged February 6, 1917, with the wound well healed, twenty-four days after the radical aseptic amputation of the rectum. Since then I have seen the patient, about one year after the operation, when she was perfectly well, and again two weeks ago when she was in perfect health.



Case III. Mr. R. had been suffering for years from extensive leutic stricture of the rectum with proliferating proctitis and leucoplakia of the rectum. This patient was operated upon by the above technic, and within three weeks of the operation his



entire wound was firmly healed except for a tiny sinus below the artificial anus where the drainage tube developed a small local abscess probably due to some of the chromicized gut used in closing the levator muscles.

I recommend this method of aseptic amputation of the rectum as it saves the patient a long stay in the hospital. The average stay of patients operated upon in the older way with peritoneal cavity opened is well over eight weeks, as opposed to about half that time in the above cases. Moreover, by keeping the wound free from infection the nursing and house staff are spared a lot of unnecessary work and the patient a great deal of discomfort.

PERIANAL INFECTION.

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A discussion of perianal infection can be made to include all types of infection in this region, but I shall consider here only that type of infection involving the deeper structures and developing abscess.

Infection of the tissues in the perianal region is a very frequent occurrence. It is my purpose to direct attention to the importance of more direct treatment of these comparatively simple conditions on the part of the general practitioner. Physicians as a rule are inclined to treat rectal conditions "indirectly"; examination of these parts as a rule is neglected, and simple infections are allowed to develop into serious ones before treatment is instituted.

The anatomical structure of the tissues surrounding the rectum, its vascularity, the liability to infection, trauma either internal or external, the presence of indigestible food remnants within the bowel, irritation externally the result of discharges, the constant presence of pyogenic bacteria from the stool, the plentiful lymphatic supply, all tend to become producing factors in infection and inflammation in this region.

A simple infection of the hair follicle not properly treated will extend into the deeper structures, the pus burrowing its way between the tissues and into the intracellular spaces, the pressure breaking down the cell wall and an abscess cavity resulting. Abscess in this region is usually designated by its location in relation to the surrounding structures. The designations as given by Tuttle are classical for proctologists. This list is here omitted for it is my object to be brief and to direct attention to treatment. A neglected furuncle will act as a nidus for greater infection, it involves the cellular tissue and spreads rapidly, pus forming quickly, with the production of pain, swelling and a rise of temperature, associated with loss of appetite and malaise. The ordinary treatment prescribed—the use of antiphlogistics of every kind—eventually produces a rupture of the skin surface with the consequent relief of pain; or an incision may be made by the physician before rupture with the result of relieving the acute symptoms but unfortunately this is the time that more trouble starts. If spontaneous rupture occurs without the aid of a doctor the patient stops treatment, the discharge continues, the pus—because of insufficient drainage—burrows into the surrounding tissue in the line of least resistance, which is toward the rectal wall, occasionally rupturing through into the lumen of the bowel and producing a fistula. The sequence just described occurs frequently even when the patient has had treatment by a physician; in this circumstance it is due to the fact that the incision was not sufficient to effect proper drainage and that no after-treatment was kept up to maintain drainage and allow for healing by granulation.

The reluctance with which the average physician examines the parts about the anus, is explicable only as either from carelessness or from estheticism and this in the face of the frequency in which gynecological and genito-urinary examinations are made.

Infection of the perianal structures occurs frequently from trauma within the bowel; undigested food particles, constipation, hemorroids and proctitis at times occasion the infection, through the bowel by irritation of the mucous membrane into the tissue beneath. The patient complains of fever, malaise, loss of appetite, rectal tenesmus; but he is constipated, this latter symptom being due to his reluctance to bring pressure to bear (intra-abdominal) upon the anus because of the pain resulting. The presence of a lump in the rectum is complained of. If digital rectal examination is made a swelling of the mucous membrane is felt; if the anoscope is introduced pus may be seen, the cavity usually being ruptured by either the introduction of the finger or the instrument; treatment of this type is often neglected as the relief from pain is spontaneous with rupture, and if more than the wall of the rectum is involved, and not properly cared for, fistula is the usual result.

With the foregoing as a preliminary a brief discussion of the treatment is in order. Prophylaxis is as important here as in any other preventable condition. Furuncles should be immediately incised, curreted and the cavity touched with pure phenol followed by alcohol, painting the surface with tincture of iodine before making the incision. If this is done in each instance most abscess formations will be prevented. The patient should be cautioned to observe care in the toilet of these parts after stool for a few days after incision, using gauze wet in warm water rather than the usual paper. The practice of prescribing ointments for all rectal conditions as is the usual routine in general practice, is of little value, is uncleanly. It is part of the type of "absent" treatment usually given. It is of the utmost importance for the physician to realize that it is poor practice to prescribe for what he has not investigated.

An abscess cavity, irrespective of location, requires the free evacuation of pus, and free and persistent drainage continued until the cavity has healed to the surface by granulation. If this is not done multiple abscesses are likely to occur and spread, fistulæ result, and sinuses are formed which may and often do involve the whole buttock. Digital rectal examination should always be made when an abscess is found in this region, to determine the depth of the cavity in its relation to the skin surface. Incision should be made down to the pus and a grooved director passed. If there is an opening into the bowel the director is passed through and brought out at the anus. All the structures between the director and the skin must be divided cleanly and thoroughly down to the bottom of the wound, including the fibers of the sphincter muscle. If this muscle is divided at right angles there is no danger of incontinence, but care must be taken that the incision through the sphincter be made evenly and preferably with one incision, using a sharp heavy scalpel or, still better, one of the proctotomy knives devised for this purpose by Gant and others. Incontinence is the result of irregular scar formation within the sphincter muscle and is due to irregularity in the cutting of the muscle and occasionally to hearing the muscle in forcible dilatation under general anesthesia.

Local anesthesia should be employed. If the abscess is subtegumentary and fluctuating, the skin thin, bulging and tender, the use of ethyl chloride spray is sufficient to render incision comparatively painless. In the deeper situated forms, one may use procain one-half per cent. with adrenalin injected subcutaneously, anesthetizing the tissues over and around the abscess; and it is my practice to inject the sphincters as well, in the event that the cavity involves the bowel. The deeper structure and the mucous membrane of the bowel are injected with a solution of quinine and urea hydrochloride which produces complete anesthesia. Incision should be crucial in type and at least 2 to 3 centimeters each way, so that the wound will stay open, drainage be assured and the reprehensible practice of squeezing the tissues about the cavity to empty the pus avoided. This practice is general and necessary when incisions are too small. It only increases the infection by breaking down the natural defense which has localized the condition. The use of irrigations with hydrogen peroxide is also bad surgery, the pressure produced by the liberation of oxygen in the cavity tending to force the pus and bacteria further into the tissue, breaking down the intracellular tissue and destroying the natural defense of the surrounding structures. Irrigation of the cavity with normal salt solution, or magnesium sulphate solution is all that is needed. Lightly pack the cavity with 10 per cent. balsam peru in glycerin gauze, being careful to pass a grooved director through the complete length of the wound each day to prevent the development of pus pockets in the bottom. If the sphincters have been divided the daily packing should be made by passing the gauze through the anal opening and down into the wound. Owing to the vascularity of the structures and their natural resistence to infection, these conditions heal readily by granulation and with generally good results.

In conclusion, the principle of prophylaxis should be foremost in mind, furuncles, though slight, should be treated. If an abscess exists free drainage with careful after-treatment until healing is complete should be the rule; above all, the physician should remember that treatment of symptoms in any part of the body without personal visual examination is careless practice.

TUBERCULOUS FISTULA IN ANO.

Whenever there is even a suspicion of tubercular disease, the operation should be performed with a Paquelin cautery instead of a knife. The cautery is heated to a white heat, that the blood vessels and lymphatics be sealed up and the tubercle bacilli destroyed to prevent infection.

Even though the cautery be used instead of the knife, the encircling cicatricial wall must not be broken down. The granulating lining wall is to be completely burned up with the cautery, and the overlying structures seared through to allow perfect drainage.—Charles J. Drueck in the *Mississippi Valley Medical Journal.*

A SUCCESSFUL HEMORRHOID OPERATION UNDER LOCAL ANESTHESIA.

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There was a time not so many years ago when the discussion of any surgical procedure under local anesthesia had to open with a preamble. This consisted of all the arguments that the author could muster, why local and not general anesthesia should be employed in the majority of proctologic operations. Today, however, thanks to the progressiveness of the American surgeon, local anesthesia is the method of choice in a great many different fields of surgical endeavor. One has but to note the medical history of each succeeding year, to observe the rapid strides of this safest of all anesthesias.

In the last twenty years, the proctologist has been one of the foremost in the use of local anesthesia in his work and today in many proctologists' hands, it is the anesthetic of choice in ninety per cent. of his operative work. While practically every operation in the realm of proctologic surgery can be performed under local or regional anesthesia, there is nothing which has responded more satisfactorily to surgical relief under local anesthesia than the radical treatment of hemorrhoids.

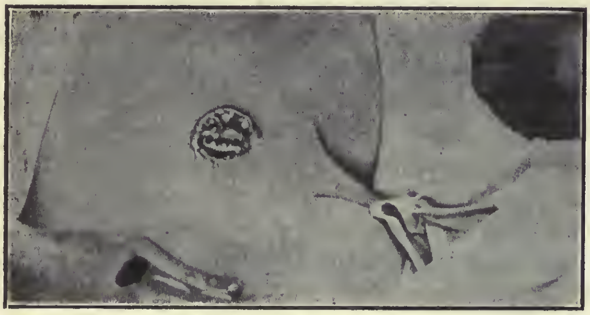

Fig. 1—Typical case of internal prolapsing hemorrhoids, suitable for local anesthesia.

In order to secure the best and most permanent results, the proctologic surgeon must endeavor in every possible way to so simplify his technic as to be able to safely and painlessly do as thorough an operation as would be possible under general anesthesia. That this can be done and has been done for many years, is now so evident that what will be said regarding the technic of the operation employed by the author, will be taken for granted to mean that local and not general anesthesia is employed.

Of much importance is the attitude of the surgeon himself towards the patient and the operation and the surroundings amid which the operation is performed. The surgeon must be able to choose his case with due regard to the type of anesthesia suitable to the individual case. There are patients with hemorrhoids in whom, on account of their mentality, anything short of complete unconsciousness will not suffice, no matter how simple the operation.

Among the things to be considered in the treatment of hemorrhoids under local anesthesia, are the following: The knowledge of various local anesthetics with the contraindications to their use; the temperament of the patient and the surroundings in which the operation is to be performed; the type and the extent of the diseased condition; the technic of the operation and its probable duration.

The surgeon and his assistants must always be in that frame of mind where the fact is never lost sight of that the patient is conscious and with his mind focused on the great event—his operation. The attitude of the surgeon and assistants, their conversation with each other and with the patient, are all noted by the patient with a resultant good or bad effect as the case may be.

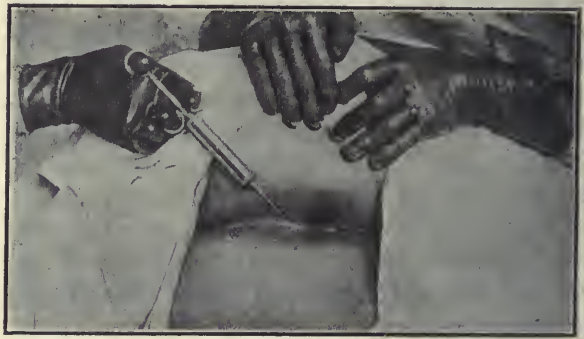

Fig. 2—Point of puncture for blocking lesser sphincteric nerves.

Some surgeons with properly equipped operating and rest rooms are able to and do perform operations for minor cases of hemorrhoids in the office, sending the patient to their homes later on. It stands to reason that no matter how simple it may appear, to the patient it is important and the latter's appreciation is undoubtedly enhanced when it is done amid the proper hospital surroundings.

In the preparation of a patient for the removal of hemorrhoids under local anesthesia, one should be just as thorough as in the preparation for the administration of a general anesthesia. The patient should enter the hospital twenty-four hours before the operation if possible and be limited to a fluid or assimilable diet. If a cathartic is to be administered, this should be done at least twenty-four hours before the time of operation. If one is not in the habit of operating in the forenoon then on the preceding afternoon and four hours before the operation, the bowels should be cleansed by means of enemas. The patient can partake of a cup of hot coffee or other fluid up to and within one and one-half hours of operation.

In personal practice from fifteen to twenty-five grains of chloretone with or without one-fourth grain of morphine is administered with some hot fluid, one and one-half hours before operation. In lieu of this, forty-five minutes before the time of operation, a hypodermatic injection of one-sixth to one-third grain of morphine, with from 1/150 to 1/175 grains of hyoscin, is administered. The use of a preliminary narcotic is of the utmost importance. It allays the fears of the apprehensive patient, it delays somewhat his reaction to sight and surroundings and puts him in at least a quiescent frame of mind towards the operation itself. The patient is not asleep during the operation but on his return to his bed usually falls asleep within a few minutes. This, I believe, is of as much importance as the blocking of painful sensations during the operative procedure. From the time of the administration of the pre-operative narcotic, the patient is kept as quiet as possible. His room is darkened, friends and relatives are not permitted to visit and with the exception of his partaking of some drinking water or perhaps a few puffs of a cigarette, he is kept absolutely quiet.

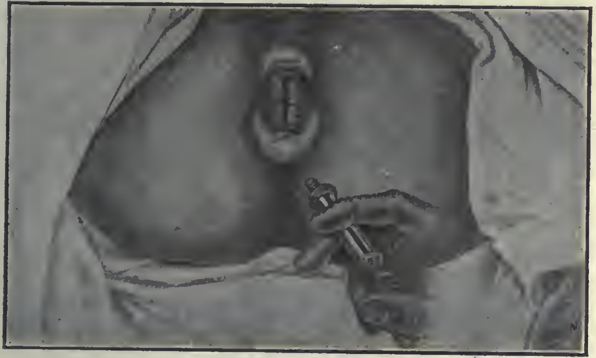

Fig. 3—Circumanal infiltration with apothesin solution.

He is taken to the operating room with as little disturbance as possible. The arrangement of the operating room is very important. The success of an operation with local anesthesia may be rendered entirely void by inattention to details. The strict observance of silence by all taking part in the operation is essential.

The operating room should be fully prepared as far as possible before the entrance of the patient. Whatever conversation is imperative, should be carried on in a whisper and the handling of instruments and utensils should be so carefully done that no noise is caused. The author uses signs and signals by gesture in indicating the instruments, dressings, etc.

The operating table should be covered with a thick pad or mattress which is well warmed and instruments and other paraphernalia should be covered and out of the patient's sight on his entrance and at no time during the operation should anything suggestive of the operation, be seen by the patient. His ears are stuffed and a mask worn over his eyes. He is placed in the left lateral or Sims' position, which is the most comfortable for the patient, surgeon and assistants. As many pillows are allowed as needed, in fact anything that will tend to make the operation more comfortable and easy, is used. There is no attempt made to tie or strap the patient in any way. The assistants, nurses and interns should never lose sight of the fact that the patient is not asleep and that while pain sensations are inhibited, the tactile sense remains wherever the surgeon touches him. The patient and his tissue should be handled as little as possible and when necessary to handle them, this should be done with "respectful gentleness."

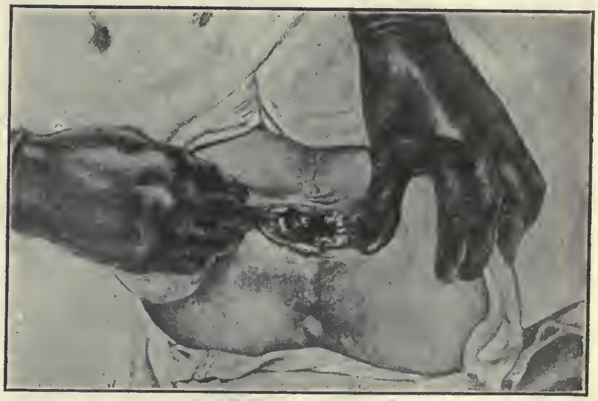

Fig. 4—Sphincter relaxation after infiltration with local anesthetic.

Many anesthetics are used in the production of local anesthesia and it is largely a question of individual preference. I prefer the American-made preparation called, Apothesin and use it in .5% solution in the following manner:

After the skin surface has been prepared by the alcohol-iodine method without shaving, a point one-half inch posterior to the posterior commissure of the anus is either pinched or touched with a swab moistened with phenol. A 30 c.c. all metal syringe armed with a three-inch flexible steel needle (22 to 26 gauge), filled with anesthetic solution, is employed. A quick thrust at the phenolized point precedes the anesthesia. The syringe should be held in such a manner that constant pressure is maintained on the piston by the palm of the hand. After insertion, the solution is distributed in a U- or V-shaped manner around the posterior third of the anal circumference in such a way as to produce pressure on the posterior sphincter nerves which enter at the juncture of the posterior and middle thirds of the sphincter. Subcutaneous infiltration should be carried out until the anus is completely surrounded by a ring of artifically produced edema. One should carefully avoid injecting the solution into the skin itself.

Above all things, when local anesthesia is being used, the surgeon must not be in too much of a hurry to start his operation. A three- or five-minute pause after the injection will greatly enhance the value of the anesthesia. The failure to produce satisfactory results by some surgeons has been due to their anxiety to proceed before complete anesthesia had been induced.

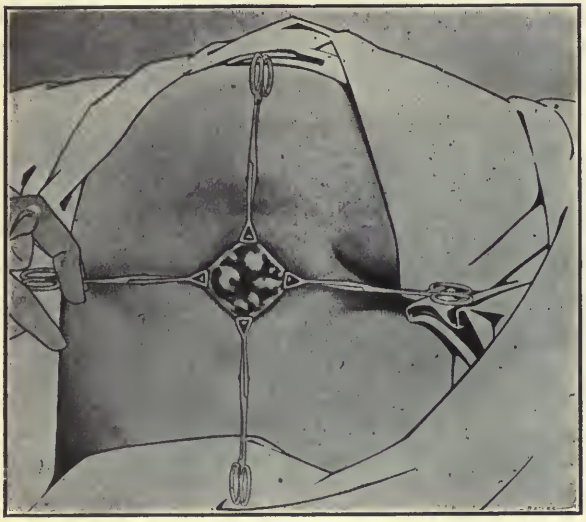
Fig. 5—Anesthesia complete and perfect exposure obtained by anal eversion with four Pennington forceps.

Circumanal anesthesia being now completed, the surrounding skin should be grasped at the four points of the compass with the Pennington triangular forceps. The traction on these four forceps everts the anus and exposes internal hemorrhoids if they have not already been prolapsed. A request to the patient to strain at this time will assist in extruding the hemorrhoids. These, in turn, are now injected with .5% solution of apothesine or if one prefers, quinine and urea hydrochloride of the same strength. A sufficient quantity of the solution must be injected into the body of the hemorrhoids to distend them one-half inch beyond their junction with normal mucosa.

It will be noted that I have said nothing about dilating the sphincter or the use of the rectal speculum. If the above is consistently carried out in the post- and circumanal injections of the anesthetic, the sphincter relaxes without any effort on the surgeon's part. The use of the four everting forceps exposes the entire operative field in a much more satisfactory manner than could ever be accomplished by any rectal speculum or retractor.

If quinine-and-urea has been used as an anesthetic then it is necessary to wait for ten minutes for anesthesia to become complete. Otherwise one can proceed at once with the operation.

The technic which I have used with the utmost satisfaction for many years is as follows: The most dependent hemorrhoid is grasped with a special forceps devised for the purpose, and drawn down in its long axis, then a right-angle-curved blunt-pointed ligature carrier threaded with No. 2 catgut is passed into, underneath and around the hemorrhoid at its juncture with healthy mucous membrane. The ligature is tied, being pushed up by the finger of one hand during the tying process. One end of the ligature should be left fourteen inches long and the other about six inches. Next, the anterior hemorrhoids are ligated in the same manner, then the posterior and upper in the order named. By ligating all the hemorrhoids in this manner before excising them, operative hemorrhage is either prevented entirely or reduced to a minimum.

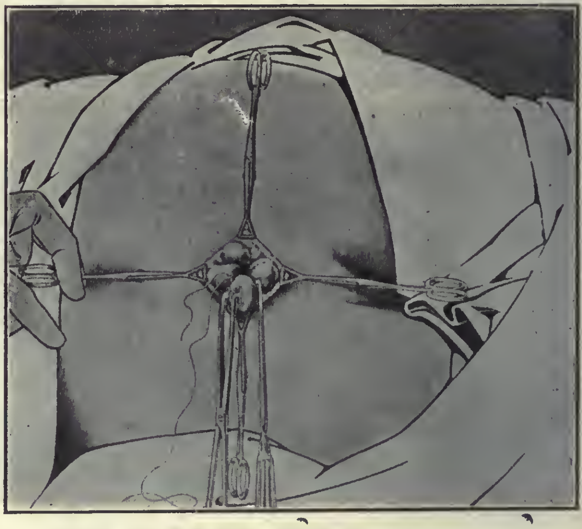
Fig. 6—Passing ligature at juncture of hemorrhoid with normal mucous membrane.

Returning now to the hemorrhoid first ligated, this can be seized with the author's forceps and with sharp-pointed scissors curved on the flat, is excised from without inward, care being taken to remove all the hemorrhoid, saving as much of the normal mucosa as possible. Later any redundancy can be trimmed before the operation is completed.

The pile is now cut away one-fourth inch below the ligature, the ligature being held toward the opposite side of the patient away from the hemorrhoid being excised. This keeps it away from the wound and it cannot be accidentally cut.

Next, with the curved scissors and sharp-pointed forceps, the pile mass is carefully dissected. The thrombosed vessels are removed down to the sphincter if necessary. The exposure of the diseased vessels making up the hemorrhoid is aided by the upward and outward pressure of the surgeon's fingers on the external skin beneath the hemorrhoid. The wound is better left open and nothing more need be done to it except trimming of the excess mucous membrane so as to allow a longitudinal wound to remain. If there is any oozing, the long end of the ligature can be made to act as a suture by threading it into a small curved needle, and the wound sewed with a continuous running stitch. The threaded end of the catgut can be tied to the short end of the ligature which further draws up and contracts the wound. The other hemorrhoids are removed in a similar manner in the same order in which they were injected.

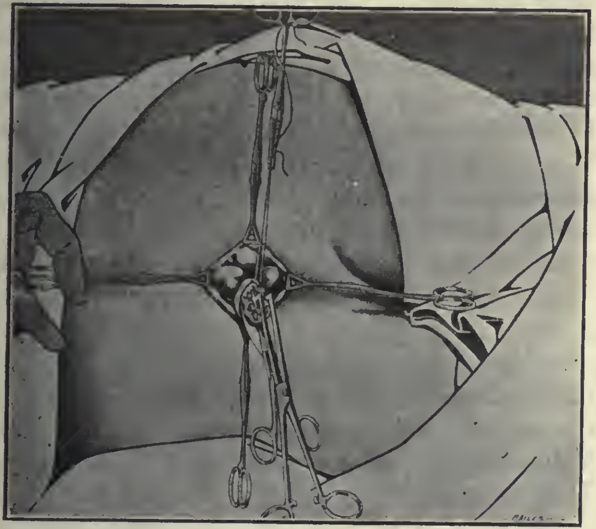

Fig. 7—Technic of excision of hemorrhoidal tissue with conservation of mucosa.

To insure good post-operative anesthesia the injection of quinine and urea solution can be made under each line of suture. A firm perineal dressing is applied, the only application to the wound being plenty of petrolatum. If good sphincteric anesthesia has been obtained one need have no fear regarding post-operative pain. Should the patient, however, suffer at all after the operation, the administration of sufficient morphia to relieve him is of the most important services that can be rendered by the surgeon. The amount of morphia administered in the first twenty-four hours after the operation should be governed by the real needs of the individual patient and not by a dose-book. After the first day, morphia or any form of anodyne or opiate is not indicated if one carefully follows the technic outlined above.

With only slight modifications and refinements, this technic has been used by me for over fifteen years. The results have been so extremely satisfactory that it is recommended to those of the profession who desire a simple, satisfactory and thorough operation for the permanent relief of internal hemorrhoids under local anesthesia.

Kresge Building.

THE ROENTGEN RAY IN THE DIAGNOSIS OF ILEO-CECAL VALVE INSUFFICIENCY.

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Roentgenologist, Newark Memorial Hospital; Consulting Roentgenologist, Perth Amboy City Hospital,
Newark, N. J.

The ileo-cecal valve is situated between the caput coli and ascending colon, and about one inch above the valve of the appendix. Undoubtedly its function is to prevent a too rapid ascension of the food into the colon and also to prevent a return into the caput coli and ileum. It is obvious that the occurrence of either, or both, would be a derangement of the normal intestinal mechanism which, *if constant*, must affect the health of the individual. It is not safe to infer that an incompetency resulting from an enema, introduced with great hydrostatic pressure, is a pathological condition nor is it wise to deduce that an incompetency of the ileo-cecal valve giving *no* intestinal symptoms is significant of a serious derangement even if it is an abnormal function.

In some of the army camps during the recent war, it was found that the large majority of enemas introduced resulted in a return flow into the ileum. This can be explained on the theory that the roentgenologists and gastroenterologists were not accustomed to give enemas under carefully regulated low pressure.

Groedel, Case, Holzknecht and many others, in their study of the intestinal tract, see in an incompetent valve a derangement of the normal function which merits consideration; while others, equally numerous, disregard it as a clinical entity.

The writer has made it a rule, based upon no scientific research, but upon abundant clinical experience, to consider incompetency of sufficient importance only when correlated with vague abdominal symptoms and where no other lesions can be determined roentgenologically.

That ileo-cecal incompetency will produce symptoms from which the patient suffers considerable annoyance is undoubtedly a fact and is well illustrated by the following case, which is only one of a large number:

Miss H. S., a nurse, forty-four years old, was referred by a gastro-enterologist for an intestinal examination, January, 1918. She complained principally of abdominal distension and pain reflected to the *left* side. Roentgen examination of the colon by enema showed a return flow into a large portion of the ileum and its terminal end closely approximated to a contracted cecum. No other defects were seen. The Roentgen findings were, incompetency of the ileo-cecal valve with adhesions at the cecum and terminal ileum. The patient was referred to a surgeon who, unfortunately, considers ileo-cecal incompetency of no significance. He operated without giving the valve condition any or sufficient attention. At least the result was unsuccessful. The symptoms persisted. Five months later, getting no relief, the patient was re-examined and the original defect was again demonstrated. The patient was again operated upon by another surgeon who performed a Kellogg operation with success. To confirm the diagnosis and the mechanical result of the operation, a barium enema was given on October, 1918, and *no* return flow was observed. The patient has been well to date.

The introduction of a barium enema for Roentgen examination is of sufficient importance to merit a description.

Because of the weight of the barium (8 ounces) and the quantity of water, which must not be more than just enough to produce only slight distension, great care must be exercised. The tube is introduced into the rectum not more than 1 to 1½ inches in order to avoid spasm; the container is held 2 feet or less above the patient and the flow is regulated by *manual* compression. The enema is *slowly* introduced with occasional intervals of cessation to permit the fluid to slowly gravitate upward. When complaint is made of pressure, not at the rectum but at the upper abdomen, the current is shut off.

An enema given with a proper degree of caution and under constant control will not produce an ileocecal incompetency in a normal colon.

Ileo-cecal incompetency as a result of chronic appendicitis, perityphlitis, etc., is secondary and is not discussed here.

2 Lombardy Street.

Hot rectal irrigations through a two-way tube are helpful in the treatment of acute gonorrheal prostatitis.

TRAUMATIC ULCER OF THE RECTUM, WITH SYMPTOMS SIMULATING SACRO-ILIAC AFFECTION.

A CASE REPORT.

Harry Goldman, M.D.,

Proctologist to the Frauenthal Clinic,

New York City.

Mrs. D., aged 46, two children, normal confinements. Never had serious illness or injury. About one month before she came under our care she began to feel pain in the region of the left sacroiliac joint extending down the thigh and leg, which was exaggerated whenever her bowels moved and continued for a time after the movement. The pain was getting worse and she consulted a physician who made a diagnosis of sacro-iliac affection, and explained that the hard stool passing the affected part increased the suffering, so he prescribed calomel to liquify the movements and advised rest in bed for a few days and promised to put her in a jacket in the near future. The purgative caused frequent, irritating movements and the pain became almost continuous.

Examination of the sacro-iliac joints was negative, and pressure over the sciatic nerve was not painful.

Following the regular procedure in Frauenthal's Clinic where all cases of indefinite pain in the back and leg are sent to the rectal department for examination, this patient was referred for proctoscopy. This showed a long, narrow superficial ulcer on the posterior rectal wall about five inches from the anal orifice. On removing the instrument the patient complained of the same severe pain as when having a bowel movement. I ascribed the scratch to the passage of a foreign body such as a fish bone, but found that previous to the onset of pains, she lost and possibly swallowed a large inlay from one of her molars. The molar cavity was large and irregular with a number of undercuts, so that the inlay had a number of sharp spurs, one of which had cut the rectal mucosa when passing out with the stool. The recto-sigmoid juncture is opposite the left sacro-iliac joint, and the meso-sigmoid and meso-rectum are attached opposite the joint; and I believe that in this case the pain was reflected through the superior hemorrhoidal nerves of the inferior mesenteric plexus and branches of the sacral plexus which is the innervation of that portion of the rectum which was affected.

Constipating the patient with opiates, and a few local applications of silver nitrate cured her.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

New York, February, 1920.

RECTAL EXAMINATIONS.

Readers of the articles contributed to this issue of the Journal will, we are sure, be impressed with the statement repeated in several of them that very many of our colleagues neglect to examine the rectum of their patients even in conditions, such as those described in these articles, where the symptoms point clearly to an affection of the rectum or anus. Though we know it to be true, it is hard to understand why so many physicians fail to avail themselves of the information—negative or otherwise—that may be revealed by a simple digital exploration of the rectum. It is a most valuable aid in securing a knowledge not merely of processes within this canal but also of those that may be going on in the pelvic organs and tissues about the rectum. Many times, in otherwise obscure diseases or complications, simple palpation through the rectum at once establishes the diagnosis!

CANCER OF THE RECTUM.

Rectal carcinoma does not extend early; it tends for a long time to remain localized. This fact would make its radical removal a very hopeful undertaking if the growth were discovered promptly. Unfortunately, however, as with other cancers in concealed portions of the body, carcinoma in the large bowel is usually not noted until it has advanced to ulceration or grown large enough to become obstructive.

We have come to recognize that extirpation of the rectum by the sacral route only often fails to cure, even in apparently well localized cancers, because metastases in the retroperitoneal lymph nodes or in the liver are not revealed to the surgeon. Only by abdominal exploration—whether or not the "combined operation" is performed—can the surgeon assure himself either of the operability of a rectal cancer, or of the extent of the procedure needed to effect radical treatment.

Gynecologists have suggested that women submit themselves to periodic examinations in order to discover uterine cancers in their incipiency. When the public has learned the advisability of routine physical examinations at stated intervals, digital exploration of the rectum as part of that examination will reveal neoplasms at a period in their development when surgery can give greater assurance of their cure.

Surgical Suggestions

Diverticulosis is most common in the sigmoid but it may occur elsewhere in the colon or in the rectum.

Diverticulitis may much resemble, in clinical and physical signs and in roentgenographic appearance, a carcinoma. The differential diagnosis can then be made by means of sigmoidoscopy and removal of a bit of tissue.

Diverticulosis of the sigmoid, adherent to the bladder (peridiverticulitis) may manifest itself chiefly by urinary symptoms; the urine, however, is clear unless the lesion perforates into the bladder.

A diverticulitis giving but scant symptoms may nevertheless be the primary cause of an abscess of the liver.

All cases of diarrhea, of mucous or bloody evacuations, of obstipation that do not promptly subside under medical treatment, should be investigated for a gross lesion of the bowel—by roentgenography, proctoscopy and sigmoidoscopy.

Pituitrin injected intramuscularly or intravenously is life-saving in some cases of post-operative "ileus."

Surgical Sociology

Ira S. Wile, M.D., Department Editor

INCORRECT STATISTICS OF INTESTINAL CONDITONS.

From the standpoint of the student of morbidity, the lack of adequate statistics on the frequency of disease states is discouraging. For the most part, reliance must be placed upon the study of mortality figures, save in so far as data are procurable relative to reportable diseases, particularly those of a contagious nature.

For accurate conclusions, dependence must be placed upon the precision and reliability of physicians' reports as entered upon death certificates. Failure to enter upon death certificate qualifying terms leads to error in the classification of death on the basis of causation. Frequently several items are entered upon the death certificate but only one can be registered as the cause of death, and the question often arises as to which was the chief or primary factor concerned. Frequently an effort is made to differentiate morbid conditions as the real cause of death or the contributary cause, but as these terms possess different meanings to various physicians, bureaus of registry are placed in a quandary as to the exact interpretation of the real cause of death.

In its effort to check up the cause of death and to emphasize the necessity for precise and complete information, the Bureau of Census has sent queries to physicians to elicit further information regarding conditions which lack the clearness necessary for trustworthy statistical compilation.

During 1917, 43,876 queries were transmitted for further light upon the causes of death as reported. The value of this is evidenced from the fact that 4.1% of all death statistics demanded this special inquiry, as a result of which 52.5% of the cause of death questioned, were placed under a classification other than that suggested by the original death certificate.

As an evidence of the importance of accuracy, it is interesting to note that ulcer of the stomach, for example, would have been classified originally under a variety of terms, such as cardiac dilatation, pulmonary abscess, gastritis and indigestion, peritonitis, Bright's disease, nephritis, anemia. Appendicitis and typhlitis would have been classified in 159 instances as croup, septicemia, sepsis, blood poisoning, cerebral abscess, meningitis, cardiac dilatation, broncho-pneumonia, pneumonia, pulmonary congestion, pulmonary abscess, gastritis, gangrene of intestines, peritonitis, nephritis, uremia, salpingitis. Hernia has been masked as septicemia, cardiac insufficiency, pneumonia, acute indigestion, septic peritonitis, senility, anasarca and exhaustion.

Intestinal obstruction has been unsatisfactorily reported as septicemia, auto-intoxication, paresis, convulsions, cardiac dilatation, broncho-pneumonia, acute indigestion, peritonitis, Bright's disease, senility, and heart failure.

Other diseases of the intestines as interpreted in the *International List of Causes of Death,* would have been hidden under the classification of blood poisoning, auto-intoxication, hemiplegia, convulsions, hemorrhage, broncho-pneumonia, gastritis, peritonitis, Bright's disease, asthenia, senility, or heart failure.

These illustrations by no means include all the changes in classification that were involved in diseases of the intestinal tract. It takes no cognizance of intestinal parasites, diarrhea, enteritis and tuberculosis or cancer of the bowels. Cancer and other malignant tumors of the peritoneum, intestines and rectum were apparently accurate as only four alterations were required from the record of peritonitis, uremia, and senility.

It is impossible to present full figures upon proctological conditions in as much as the intestinal tract is not subdivided along physiologic or anatomic lines. There is a need for more definite information concerning proctological conditions both in connection with the primary appearance of disease and the secondary manifestations, the results of medical treatment, and the immediate and distant results of operative intervention when required, together with a comparative résumé of the effects of a variety of operative procedures as related to cure, paliation and return to local and general functional ability.

The real check upon surgical and medical methods must be based upon careful statistical records. The difficulties in securing accurate certificates of death suggest a similar lack of clear understanding of causation as reflected in diagnosis. For this reason more careful attention should be devoted to the statistical phases of hospital, dispensary and private work. If proctologists were to clear up the moot questions in their own specialty, they would be setting an excellent example for their colleagues in other specialties, and would advance in numerous ways our exact knowledge concerning the origin, course and results of morbid conditions involving the sigmoid and rectum.

Progress in Surgery

A Résumé of Recent Proctologic Literature.

Observations Upon Internal Piles. W. Ernest Miles, London, England. *Surgery, Gynecology and Obstetrics,* November, 1919.

Miles presents a very thorough exposition of the anatomy, pathology and treatment of internal piles. The old classification of piles he believes to be of no practical value, *viz.,* the arterial, venous and capillary. An internal pile consists of a conglomeration of bloodvessels in the submucous tissue of the anal canal and the lower part of the rectum, which have become large and tortuous, and whose coats have undergone pathological change, partly hypertrophic and partly fibrotic. Arteries, capillaries and veins, simultaneously participate in the change, so that any given internal pile is made up of a mixture of three kinds of altered bloodvessels. Internal piles are progressive in development and pass through three distinct stages: (a) primary, (b) intermediate, and (c) final. In the primary stage, the pile is small and covered with healthy unaltered mucosa. It is not long enough to protrude. The only symptom at this stage is hemorrhage, often profuse and repeated. The blood passed is usually bright red in color. In the intermediate stage the pile, due to constant traction during defecation, becomes elongated, and protrudes during defecation. It is now increased in bulk, due to increased dilatation of the vessel, and exudation into the areolar tissue. The mucosa becomes thickened with the result that there is less bleeding, and the mucosa also loses some of its red color. Reduction is spontaneous as soon as defecation ceases. Bleeding is less frequent and profuse. At this stage, the pile can be felt as a thickened longitudinal fold, and can be seen to protrude when the patient forcibly strains down. In the final stage, the protrusion is continuous and reduced with difficulty, often requiring manual reduction after defecation. Slight increases in abdominal pressure, due to sneezing, coughing, etc., are sufficient to cause the pile to protrude. It has increased in size, due to an increased amount of connective tissue, the mucosa is thickened and tough and presents a purplish hue. Bleeding seldom occurs, unless due to traumatism. The piles may exist in all three stages in the same patient at the same time.

When every possible internal pile has developed there are usually only seven present. This is due to the fact that there are four branches of the superior hemorrhoidal artery on the right side and three on the left. In about 70 per cent. of the cases only three or four piles are present. The full complement of seven is rarely seen. The distribution of the vein is similar to that of the arteries. They arise in a minute plexus which is found in the submucosa of that portion of the anal canal which is bounded above by the valves of Morgagni and below by the white line of Hilton. This zone is known as the pecten. Miles speaks of primary and secondary piles. Primary piles are those developing in the first or larger branches; secondary piles are those developing in the secondary branches of the superior hemorrhoidal artery. Since the anatomical position of the branches of the superior hemorrhoidal artery is constant, the piles which develop in connection with them preserve an invariable position relative to the circumference of the anal canal. The primary piles are (1) right anterior, (2) right posterior, (3) left internal, corresponding to the three primary branches of the artery. This is borne out clinically by the fact that in 70 per cent. of the cases, the combination of piles occurs. Two secondary piles may be connected with the right posterior, or left internal. There are none connected with the right anterior. The secondary piles are usually closely associated with the primary. Therefore when performing a ligature operation, it is never necessary to apply more than three ligatures, even when seven or eight piles are present.

As the result of continuous congestion in the pecten zone, there is a deposit of fibrous tissue which the author has termed the pecten band. This can be felt like a rubber umbrella ring under the skin at the anal margin. Two symptoms are directly due to this band, *viz.,* the difficulty in emptying the rectum completely, and diminution in the caliber of the feces passed, the motions being voided in short pieces. The band is also responsible for the straining at stool, and for the strangulation of large piles.

Treatment in the early stage should be palliative. The indications for operation are copious and recurring hemorrhage, and uncontrollable protrusion. The author prefers the ligature operation to any of the others. As a first step he divides the pecten band by a small posterior incision, because this band cannot be stretched to allow exposure of the piles. The piles are now exposed and pulled down by slight traction. A V-shaped flap of skin is raised at the muco-cutaneous junction at the location of the primary piles, and a ligature tied in the groove as high up on the pile as possible. Three ligatures are tied corresponding to the location of the primary piles. The piles are then replaced without excision. The preparatory and after-treatment correspond with the well-known methods. Cures should be 100 per cent. The author has operated over 5,000 cases. There is no loss of blood, and edematous tags of skin are not left behind.

A Case of Tuberculous Hemorrhoids, with Ulcer of the Tongue. Frank Smithies, Chicago. *Quarterly Medical Clinics,* 1919

This interesting case had a history of nine months' duration. The first symptoms were a few hemorrhoidal projections. These were followed by bleeding, and the gradual formation of a large peri-anal ulcer. One week before examination by the author, the patient developed a sore on the tongue, of an herpetic character. Examination of the tongue showed a shallow, oral ulcer near the tip, with ragged edges, and covered by a greyish, yellow, easily bleeding membrane. There was a large peri-anal ulcer, involving two-thirds of the peri-anal zone, and extending into the right buttock, with areas of necrosis and exuberant granulation tissue. This ulcer was very painful and also bled easily. Sections from the tongue ulcer, showed enormous numbers of tubercle bacilli. The lungs showed evidence of old tuberculosis. Repeated examinations of the peri-anal ulcer failed to show tubercle bacilli. The Wassermann reaction was negative. However, the peri-anal ulcer was undoubtedly of tuberculous origin. The subsequent history was disappointing. There was practically no improvement, after *X*-ray, cauterization or curettage, or medical treatment.

Tuberculous Ano-rectal Fistulas. Report of Two Cases Showing Secondary Lung Involvement and Late Clinical Evidence of Their True Character. S. Mortimer Hill and Arthur A. Landsman, New York. *Journal of the American Medical Association,* March 22, 1919.

A tuberculous fistula has an external opening that is patent, irregular and usually larger in size than that of the simple variety. It is more or less insensitive to probing and manipulation; discharges a thin, dirty gray material, seldom thick or creamy, and the skin surrounding it is bluish, undermined and unhealthy looking. The hair on the immediate neighboring parts is long, fine and silky; the buttocks are flattened, and the ischial tuberosities are prominent. While not all of these signs are present in every case, one or more of them are regularly in evidence very early in the disease, thus putting the surgeon on his guard in making his prognostic and therapeutic considerations.

Exceptionally we may meet some cases, however, in which they are doubtful, delayed or absent, in consequence of which it may not be recognized until late that we are dealing, not with a benign local infection, but with a serious general disease.

Two such cases are reported. They both began with what appeared to be an ordinary abscess and fistula about the rectum, persisted for a considerable time without showing any signs that would lead one to suspect their true nature, and were followed by pulmonary involvement.

Clinical signs that would serve to distinguish between specific and nonspecific local lesions about the rectum may be late in making their appearance; consequently, laboratory examination should be resorted to as early as possible.

The Treatment of Certain Types of Ano-Rectal Fistula.

ARTHUR A. LANDSMAN, New York. *Surgery, Gynecology and Obstetrics,* March, 1919.

The successful operative treatment of anorectal fistula has offered difficulties which are nothing short of surprising, when we consider the brilliant achievements of the surgery of other regions. The end-results have been far from satisfactory, even at the hands of the most expert, judging by the frequency of recurrences. Every surgeon must recollect instances in which radical operation, apparently thorough and complete, has been followed by humiliating failure.

The author has observed that, under certain conditions, a complete ano-rectal fistula will heal and remain closed even if its internal opening is left undisturbed. His method is, to cut into one of the external openings, and connect all of the tracts of one side with each other by suitable incisions, break up all pockets, trim away scar tissue, exuberant granulations, and as much of the edges of the wound as appear dead, or badly infected, attend to hemostasis, and convert the wound into one single cavity with walls smooth and clean; then repeat the process on the other side, *without, however, dividing the sphincter on either side.* This procedure provides for the necessary drainage. The next step is intended to immobilize the parts by cutting through both sphincter muscles in the posterior median line, regardless of the location of the internal openings. This enables the parts to secure the rest they require to complete their healing, and does away with the necessity of the division of the sphincter on each side, in two different places. Moreover, the posterior incision is in a neutral position in respect to both fistulas, and will confer equal benefit to both, instead of much benefit to one, and but little to the other. It possesses the further advantage of enabling us to drain both ischiorectal fossæ through a single opening, and is less liable to be followed by damage to the fibers of the external sphincter. Because of their anatomical arrangement, these can be practically split in this situation, instead of being divided transversely. The posterior incision does not injure any vital parts, and being in a more dependent position when the patient is in bed, enables us to carry out drainage more easily; while anteriorly there are important organs in both male and female, besides dense fibromuscular structures which meet at the central tendon of the perineum, and are necessary to the integrity of the pelvic floor. Their division impairs the strength of the outlet, and causes sagging of the supporting muscles, an obvious objection in female patients.

The rest of the treatment is carried out with the same painstaking care which should be the rule in all cases of fistula. Landsman tried the plan in a limited number of bilateral anorectal, and so-called horseshoe fistulæ, and would recommend its use in suitable cases.

Diagnosis of Fistula in Ano.

G. L. MCWHARTER, Chicago. *Surgical Clinics of Chicago,* April, 1919.

The author quotes Tuttle's figures to the effect that out of a series of 2,196 cases of fistula in ano, less than 45 per cent. were cured. The reasons for the large percentage of failures are, chiefly, failure to find the internal opening, overlooked pockets or collaterals, failure to remove the pre-disposing cause, as for example, a pocket in a sinus of Morgagni, hemorrhoids or a prolapse, and lastly neglect in dressings.

The usual cause of fistula in ano is a peri-proctal abscess which has been neglected, and after breaking open has formed a fistula which rarely heals by itself. The infection may be pyemic or due to tuberculosis or syphilis.

In order to locate the tracts and openings before operation, proctoscopy is necessary. Injections of methylene blue often aid in localizing the internal opening. The procedure of passing a probe through the tissues from the external opening, until felt under the mucous membrane, then pushed through to complete the sinus, should be condemned.

In the treatment of fistula in ano, the general surgical principle rests upon the division of the tissue between the fistula and the anal canal. This converts the fistula into an open gutter which may heal by granulation from the bottom. Care should be taken to cut through the sphincter muscles at right angles and not obliquely. In horse-shoe fistulae with multiple openings, an encircling cut is made in the skin and only one cut through the sphincter.

A Simple Method of Controlling Secondary Hemorrhage after Operation for Piles.

R. BRUCE JAMES, Danville, Va. *Virginia Medical Monthly,* January, 1920.

The case of secondary hemorrhage reported did not admit of anesthesia or packing, or being disturbed in any way; to keep the patient alive until the hemorrhage could be controlled was no simple matter. James devised and quickly made a simple but effectual apparatus for controlling this hemorrhage without disturbing the patient, by slipping a rubber glove-finger over a glass tube three inches long, and wrapping the open end of the glove-finger securely around the near end of the tube, and attaching to the projecting tube a rubber bulb such as is used in a common atomizer. By inserting this rubber-covered tube between the sphincters and pumping in air, sufficient compression was produced to control the hemorrhage, with no pain or distress to the patient and without disturbing him in the least. A clamp was placed on the rubber tubing, and the apparatus was left in place for three days when on removing the clamp the air escaped and in an hour or two the apparatus had come away without the knowledge of the patient.

This simple apparatus worked well in this case, but it is very defective in that one cannot tell while using it whether there be internal hemorrhage or not. James has therefore had made a tube that avoids this difficulty, and will allow any fluid or gas that collects in the rectum to pass out. The tube should be made of hard rubber with proper stop cock attachment.

Five Interesting Cases in Rectal Pathology.

GRANVILLE S. HANES, Louisville, Ky. *Mississippi Valley Medical Journal,* January, 1920.

The first case was a large papilloma (no report of microscopic examination) without villi, filling the lumen of the rectum. It was treated by high frequency applications ("fulguration"), the insulated copper wire electrade being passed through an angulated glass tube as a handle.

The second case was a rectal stricture in process of formation. The patient had had syphilis thirty years before and Hanes believes the condition was luetic, although the blood Wassermann reaction was negative. The extraordinary feature of the pathology is that numerous, small, friable, vascular tumors may be seen growing upon the inflammatory surface. Their growth never exceeds three-quarters of an inch in length and they are usually larger at the base than at the apex. They are very friable and can be easily torn away from the wall of the bowel upon which occasion there is excessive hemorrhage. The patient had six or eight of these small tumors which were destroyed by the use of the fulgurating current.

The next three cases were instances of very frequent urination with negative findings in the urine and the urinary tract, in which Hanes found an ulcer on the anterior wall of the rectum in two, and an inflamed, thickened and excoriated condition of the anterior rectal wall in the third (a boy of 12).

An additional feature of interest in this last case is that he has developed an irritability in the rectal outlet and has very tightly contracted anal muscles, and as a consequence he has a tendency to the constipated habit. All infections involving the mucosa of the sigmoid and rectum will, in the course of time, affect the anal structures. The parts become very sensitive, the muscles irritable and contracted which results in a very marked hypertrophy of the anal muscles. This will always produce constipation or more properly speaking, obstipation, unless there is a tendency to diarrhea due to a diseased mucosa higher up in the colon. Hanes feels confident that all inflammatory affections occurring in the rectum and its outlet are secondary to an earlier infection higher up in the intestinal tract. We have discovered that many patients who have infections in the sigmoid and rectum histories of typhoid fever, dysentery, diarrhea, marked types of indigestion, etc. Hanes is of the opinion that patients are never entirely normal after having had a well established bacterial infection in the alimentary tract; and that the future will reveal many explanations for numerous obscure symptoms and conditions that are now observed in the abdomen alimentary tract and rectal outlet, which depend upon various types of infection of the mucosa of the intestinal canal.

Stricture of the Rectum. Frank C. Yeomans, New York. *Journal of the American Medical Association*, September 13, 1919.

The generally assigned causes of rectal stricture are pressure of the fetal head in prolonged labor, enteroliths, unskilled instrumentation, and operations for fistula, hemorrhoids and resection. Yeomans has never seen a case in which pressure of the fetal head alone caused it. Foreign bodies may cause abscess and constriction, and so many enteroliths, though he has never seen it from the latter. In one case he has seen stricture from clumsy instrumentation. Strictures may be congenital, but these are usually curable unless a fibrous partial membrane persists. Stricture should never follow a properly performed operation for piles. It may follow a Whitehead operation; other equally unfortunate sequels following this operation have caused Yeomans to abandon it, as safer and better methods are possible. Inflammatory conditions are the cause of the great majority of strictures, although it is doubtful, he thinks, whether a simple infection may cause a stricture. Specific infections are tuberculosis and syphilis, but the former tends to cause stricture in the small intestine rather than in the rectum, and stricture from this cause is rare, even above the cecum, in proportion to the number of cases of intestinal tuberculosis. Tertiary syphilis is rightly agreed to be the commonest cause of rectal stricture. In a word, the formation of inflammatory stricture depends on an extensive production of persistent contracting connective tissue. Other strictures are of the spasmodic or phantom type, or are due to inflammation of the valves of Houston, which occasionally occurs, or of adjacent organs, or due to operations on them. For diagnosis, Yeomans would not only discover the stricture, but would determine its nature and condition. Most of them are within reach of the finger, but the use of the proctoscope is advisable, as well as the taking of roentgenograms. The Wassermann test should be used in every case. The prognosis is good for congenital and traumatic cases, and with proper management, comfort and long life may be permitted in the other forms, except in tuberculous cases. Nearly all operative strictures could be prevented; and most ulcers, in their early stages, respond to treatment, without leaving very troublesome scars; but the most important measure of prevention is treatment in the prestricture stage. After development, constitutional, local and surgical treatment are required. Yeomans gives a table showing the results in fifty cases, at various ages and stages. One of the cases is briefly reported. To the salient features, attention is thus called: "1. Thirty-seven of the fifty cases, including seven in which strictures were due to fistulas, were inflammatory. 2. Twenty-four, or nearly 50 per cent. of all cases, were syphilitic. 3. Of the patients in the syphilitic cases, eight were males and sixteen females; sixteen were white and eight colored; the Wassermann reaction was positive in eighteen and negative in three clinically syphilitic, and in three cases the test was not made. The reaction was therefore positive in 86 per cent. of the cases, in which the test was made. 4. In forty-seven cases, or 94 per cent., the strictures were within 10 cm. of the anus, and therefore palpable. 5. The patients in forty cases were treated and observed for a long time. Of these, one, tuberculous, died in three years; the condition in twenty-nine was improved, that is, the patients have maintained comfortable lives, and ten, two of them syphilitic, were cured."

Imperforations of the Rectum and Their Treatment. J. Rawson Pennington, Chicago. *Illinois Medical Journal*, April, 1919.

The author recognizes three classes of malformations of the rectum.

1. The rectum communicating abnormally with the bladder, urethra, vagina, etc., due to the persistence of the original opening into the cloaca.
2. Non- or imperfect development of the post-allantoic gut (rectum).
3. Non- or imperfect development of the proctodeum (anus).

This paper considers the latter two forms. In the second class (imperfect allantoic gut), the rectum may end blindly, and may or may not be attached to the skin by a fibrous cord. The rectum alone may be lacking, or the sigmoid as well, with more or less of the colon. The anal depression may be present or absent. In this type the bowel is not attached to the male or female sexual organs.

In class 3, the rectum and proctodeum are divided by a persistent anal membrane (which ordinarily disappears at the end of the third month of gestation), or the proctodeum is either partly or wholly undeveloped. From the standpoint of treatment, the indications are two-fold—to open up a channel for the evacuation of feces and to place the opening at the site of the normal anus or as close as possible. When the latter indication is the only one to be met, operation may be delayed. When the channel must be opened, operation should be performed immediately. Colostomy may be done as a preliminary measure. The ultimate object, however, should be to bring down the rectum to the normal outlet.

The Advantages of the Vaginal Route in Resection of the Rectum for Cancer. William Edgar Darnall, Atlantic City. *Journal of the American Medical Association*, June 7, 1919.

The technical advantage of the vaginal over the sacral route should be apparent to him who understands the anatomy of the pelvis. There are no important structures to be taken into account below the perineal fold, except the two tubes which pass out through the levator ani muscles, namely, the vagina and the rectum. The operation by the vaginal route consumes less time, there is less traumatism to the tissues, there is less hemorrhage and consequently less shock, which is an important factor in these weakened and toxic patients. There is no bone resection as in most perineal and sacral operations. The dissection by the vaginal route is easy, exposure is more perfect, and one works in an open field, rather than in the dark, thus being able to control the hemorrhage. The operation is practicable only when the tumor is movable and situated in the lower half of the rectum.

The main points in technic are set down. A transverse incision is made across the vagina at the junction of the mucous membrane of the posterior vaginal wall and the cervix. Perpendicular to this, a median incision is carried down the whole length of the posterior vaginal wall, to the anus. If the sphincters are to be retained, this incision should be deflected to each side of the anus. A large thick flap is raised to either side of the incision, and the rectum is exposed and lifted from its bed by blunt dissection. It may then be easily pulled forward, and it is surprising how large a loop may be brought down. The rectum is then clamped and resected. A one-inch rubber tube is sewed into the proximal end and brought down through the anus, over which the anastomosis is completed. After the rectal work has been completed the perineal floor is rebuilt as in extensive plastic work.

An Experimental Study of the Use of Detached Omen-Grafts in Intestinal Surgery. Walter L. Finton, Jackson, Michigan, and Max Minor Peet, Ann Arbor. *Surgery, Gynecology and Obstetrics,* September, 1919.

The authors conducted a series of experimental operations on dogs to determine the value of detached omental grafts, and the proper technique for their application.

They conclude that the use of free detached omental grafts is preferable to fixed grafts, except in the presence of general infection. They may be used on any abdominal organ. The indications are to replace lost portions of peritoneum; to strengthen suture lines; to prevent adhesions, to check hemorrhages, to occlude the pyloris, to cover the stump of the cyptic duct and fallopian tube, and to reinforce the peritoneum in threatened perforations. In the absence of infection, the thin graft survives at least six months, practically unchanged.

The piece removed should be on the free border of the omentum. The latter should not be markedly puckered, and the edges should be covered. The graft must be thin, spread out carefully over the injured part, the cut edge rolled under, and fastened in place by several sutures.

The Value of the "No Good" Plication of the Cecum. Douglas H. Stewart, New York. *Western Medical Times,* September, 1919.

Stewart affirms that many of the symptoms associated with chronic appendicitis are in reality due to distended, redundant, or dilated colon. Appendicectomy affords absolutely no relief in these cases; whereas, appendicectomy and plication of the colon has given very satisfactory results. The diagnosis should always be confirmed by *x*-ray before operation.

The technic is as follows:

One cannot determine readily, from sight alone, whether plication is or is not indicated. By touch he may do so at once; because he becomes aware that there are spots or areas in the colon wall that are akin to internal hernias.

In order that the longitudinal bands may remain together after being stitched, it is necessary either to paint a little of a 3 per cent tincture of iodine upon the surfaces that are to adhere and that are to remain permanently adherent, or else, with a piece of gauze to rub a little brush burn, as it were, upon the colonic wall. In either case the stitches are to be introduced in such a manner that the iodine streak or the friction streaking shall be covered by the infolding that occurs when those stitches are properly placed and knotted. It may be well to remember that any stitches, whether single or continuous, should never cross any tinea. This will make certain that no stitch runs more than one-third of the way around the circumference of the colon and it makes strangulation impossible or other possible untoward results negligible. Also, care should be taken that each stitch is inserted into a tinea, slightly into the circular muscles between the lieas and into the neighboring tinea. This gives a good hold on strong tissue. When such a stitch is drawn tight, or sufficiently tight to make a bulge or pseudo-hernia disappear, then the tension is exactly correct.

Indications for Operation for Gastric and Duodenal Ulcer. Chas. N. Dowd, New York. *New York State Journal of Medicine,* September, 1919.

Dowd presents the indications for operation that were present in 28 cases of cancer, and 72 cases of ulcer of the stomach. The main indications were perforation, pyloric stenosis, gastric or duodenal ulcer, hour-glass stomach, ulcer with hemorrhage. The most difficult cases in which to show definite indication for operation were those without stenosis or hemorrhage.

Patients with perforated ulcer, with definite pyloric stenosis, with gastric or duodenal ulcer which has resisted persistent medical treatment, and with troublesome hour-glass stomachs, are surgical cases. Their proper treatment has been standardized by abundant experience. If we limit our surgery to such patients, we have a very extensive field for work and very important opportunity for aiding sufferers. It is better to err on the side of conservatism than on the side of hysterical enthusiasm for operation. But it is wrong to permit patients to continue their suffering when the correct diagnosis can be made and when a simple operation will cure them.

The diagnosis may be complex. Pain, pyrosis, flatulency, acidity, vomiting, loss of weight, hematemesis, melena, gastric retention, *x*-ray evidence of lesion, chemical evidence of disturbed function, abdominal rigidity or abdominal tympany or stomach splash may all be elements in the diagnosis, but the symptoms and the examinations are to be carefully worked over with each individual. The time for "snap diagnosis" has passed. Each patient has a right to a careful study of his symptoms and of his physical condition with the aid of modern facilities.

Drainage of the Abdominal Wall in Acute Appendicitis. Daniel N. Eisendrath, Chicago. *Journal of the American Medical Association,* December 30, 1919.

In the majority of cases the McBurney muscle-splitting incision is amply large enough to remove the appendix. Its chief advantage is that it is less likely to be followed by hernia, and it also enables one to drain every layer of the abdominal wall far better than any other incision. This drainage technic Eisendrath has developed because a more or less extensive infection between the layers of the abdominal wall frequently complicates an operation for removal of the acutely inflamed appendix, even when, at operation, there is no visible sign of a spread of the infection beyond the walls of the appendix. In exceptional instances, the anterior rectus sheath is incised transversely and the rectus muscle pulled inward as suggested by Weir, in order to have a larger exposure. Eisendrath describes his method of draining the abdominal walls. In the acute gangrenous and catarrhal cases without visible perforation, the peritoneum is closed. A piece of Penrose soft rubber wicking is then placed down to the peritoneum between the edges of the internal oblique. Sutures are now inserted on each side of this drain to approximate the fibers of the internal oblique. A similar soft rubber drain is inserted parallel to the long axis of the incision between the internal oblique muscle and the external oblique aponeurosis. The cut edges of the latter are approximated up to the points of emergence of the drain. Finally, a drain made by twisting some strands of silkworm is also inserted parallel to the long axis of the wound in the subcutaneous fatty layer. Where an abscess has been found the peritoneum is not closed, but a cigarette drain is inserted into the bottom of the abscess cavity. If the abscess is in the true pelvis, Eisendrath prefers to close the peritoneum and drain only the abdominal wall. Before this, however, a suprapubic stab wound is made and a cigarette drain inserted into the true pelvis as done by Van Buren Knott. Where there is a spreading, more or less active peritoneal infection, each layer is drained as above, but the true pelvis is drained by inserting some strips of pulled gauze into a larger sized soft rubber drain, which is removed after forty-eight hours, and an empty soft drain reinserted, and gradually shortened. This individual layer drainage of the abdominal wall does not interfere with healing, and the drains are not pulled out until the skin sutures are removed about the eighth to the tenth day. The pus finds a normal outlet to the surface. The author recommends the adoption of the method as a routine.

Book Review

The Exact Diagnosis of Latent Cancer. An Inquiry Into the True Significance of the Morphological Changes in the Blood. By O. C. Gruner, M. D., author of *Biology of the Blood Cells,* etc. Octavo; 79 pages; illustrated. Philadelphia: P. Blakiston's Son & Co., 1919.

It is hard to understand how this curious work came to be written, and harder to understand how it came to bear the publisher's imprint that it does. Certainly no sane reader will believe that the author can diagnose "latent" or any other kind of cancer by the complicated blood observations and multitudinous formulæ he describes.

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THE TREATMENT OF CRUSHED EXTREMITIES.*

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The Armageddon of the nations has brought traumatic surgery again to the fore. The subject would have furnished little interest and brought scant attendance of surgeons eight years ago.

Of passing interest at last has come to be the conservation of human life and future usefulness after injuries great and small.

The dictum of your Secretary has given to me a large branch of the general subject of today. I wish I had more time to prepare the paper and that today there might be greater opportunity to discuss this most important subject.

A crush I shall assume to mean a severe injury produced by pressure or squeeze—an injury which is ordinarily termed a comminution in surgery. As a rule an injury of this kind involves, more or less, all the tissues of the affected part.

A crush may be local or general when applied to the extremities; this means one or more parts of the extremity may be involved or the whole extremity may be affected. There are, too, various grades of severity. A crush may be, and generally is, produced (1) by some force applied from without or (2) it may result from the pressure of a person's own weight, by the momentum obtained in a fall from a height or the projection from a rapidly moving machine.

It is important to keep these general facts in mind in discussing this difficult subject of crushed extremities.

The first effect of a crush is usually shock. The immediate shock is frequently quite out of proportion to the extent and severity of the injury, because in many instances it is psychic shock.

Hemorrhage is rarely serious immediately after a crush because (1) of the shock and (2) because the vessels if divided are squeezed or ground asunder. This presses the severed coats of the vessels together and in the weakness of shock this prevents immediately serious hemorrhage. Later, however, hemorrhage may be very severe. The absence of hemorrhage soon after these injuries has led physicians into the grievous error of neglecting measures to control bleeding. Many times have I been told by physicians who saw the case soon after injury: "I did not put on any tourniquet, because there was no hemorrhage." The result follows that in transporting the patient some distance "reaction" comes on and he bleeds to death before he reaches a hospital.

Practically every serious crush results in a serious potential infection. If the injury happens along a street or roadway, in cultivated fields, or in a residence occupied for many years the infection is apt to be from the tetanus or gas bacillus, probably from both. If it happens in a factory or machine shop it is apt to be a coccal infection—staphylo or strepto-coccal. Miners rarely have any serious initial infection, except in the stables; they may be infected by careless or ignorant handling after the injury, however.

The management of crushed extremities comprises, in the order of what seems to me the proper sequence, the following:

1. The control of hemorrhage.
2. Treatment of shock.
3. Measures for disinfection of the wound and immunizing the patient.
4. Treatment of the injury itself.
5. Measures to restore function and usefulness after recovery.

1. The Control of Hemorrhage. — This should be the special care of the person who renders first aid, and it is the indication before all others for treatment—if the injury has involved any part of the extremity above the fingers or toes.

As it was said above a crush will not result in immediate bleeding because of the weak heart action in shock, and the fact that the continuity of the vessels has been *pressed* asunder. This is true even if the crush has evulsed the limb. When, however, reaction takes place free bleeding will occur. This should be forestalled when it is possible to do it. This acceptable time is during the period of shock. The initial control of hemorrhage should be by a tourniquet or by a large compress upon the wound and a firm bandage to hold it in place applied from below upward. The nature of crush wounds, however, require tourniquets rather than compresses or direct packing of gauze into the wound.

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*An address delivered at the twenty-ninth annual session of the New York and New England Association of Railway Surgeons in New York City, October 20, 1919.

The placing of the tourniquet is a matter of great importance if it is necessary for it to remain in place for any length of time. The general rule should be to place the tourniquet over the *injured* tissues above the severed vessels just as near the wound as it may be placed in order to be secure.

As the bone or bones are usually fractured in crushes and it will be necessary to use a splint for transporting the patient, a good method of applying the tourniquet is as follows: Select a splint not quite as wide as the diameter of the injured part, apply this alongside the limb, place sterile gauze over the wounded area and then apply the tourniquet over and around the splint and limb. The splint will prevent circular pressure over the whole periphery of the limb, but will allow sufficient pressure over the wound and severed vessels to prevent bleeding, without devitalizing constriction, which would result in death of the tissues below the injury if left on for a period of hours.

At a proper dressing station or in the operating room severed vessels may be caught by hemostats, but they should not be ligated unless the wound has been thoroughly cleaned and disinfected.

2. Shock.—Physiologists and surgeons are not agreed as to the nature of shock. I have been deeply interested in the publications of Porter and Cannon in regard to the physiology of shock. Both Porter's and Cannon's theories have been tested by other physiologists and apparently have been disproved. In a discussion of shock (the paper read by Guthrie of Pittsburg at the 1918 meeting of the *Pennsylvania Medical Society* and discussed by Roberts of Philadelphia and Meltzer of New York), Porter's and Cannon's theories found but partial or limited endorsement and other theories were advanced. Guthrie, after mentioning all of the up-to-the-present accepted theories, says in the laboratory none of them has proved generally correct and he frankly says no theory so far advanced will explain all the phenomena of shock, nor will the condition mentioned by writers and experimenters when repeated in the laboratory invariably produce shock.

I myself at present feel more inclined to Crile's exhaustion theory than ever. If this condition of nervous exhaustion has occasionally as one of its phenomena acidosis, and at another time a rapidly developed ptomaine, leucomaine or other poison, with a stasis of oxidation, the outstanding practical fact remains that the condition of shock shows the physical and physiological indication of profound exhaustion. I do not purpose to rehearse here these symptoms and signs of shock; they are quite familiar. Also the ordinary measures for treating shock are so well known that it would be superfluous to rehearse them here.

The key to the situation, in my opinion, is the blood pressure. No serious operative procedure should be undertaken after a serious crush injury if the systolic blood pressure is below 80 mm. One should content himself with the control of hemorrhage and the application of a very careful antiseptic dressing. Then put the patient into a warm bed, apply heat externally, give a warm normal saline hypodermoclysis,—500 cc with perhaps 10 to 15 cc. of 1-1000 sol. of epinephrin hydrochloride. Many surgeons recommend an intravenous injection of the saline solution, and if there is a serious acidosis the addition of bicarbonate of sodium to the infusion. I must warn against the use of intravenous injection except by a very skillful man who thoroughly understands the technic of the administration, and is indoctrinated into the indications for discontinuing it, or for giving more. The fluid must always be given *very slowly* and with little pressure. In the hands of the ordinary interne or the occasional user the method is fraught with danger. I think I have seen several patients hastened out of the world by this intravenous saline solution injection.

I am now very much impressed with the value of proctoclysis, normal saline solution given quite warm (110° F.) by the drip method into the rectum. Primrose of Toronto, and others recommend, as a result of their experience at the front, transfusion of blood. They have found it very effective in many cases.

Whatever method of restoring the strength of the patient be used the operation may be delayed as long as 40 hours with benefit to the patient, and a much better chance of recovery provided serious sepsis does not occur. When the blood goes above 85 systolic presssure the necessary operation may be attempted.

3. Infection.—As stated before, practically every crush injury will have been infected. In civil life the infection is not often a gas bacillus nor tetanus infection. As these disastrous infections may occur, it is always well to bear in mind the kind of environment or locale which is apt to produce them. Human and horse excreta especially breed these bacilli: one should inquire diligently as to the surroundings of the patient at the place where the injury occurred. In filthy houses long

inhabited, in highly fertilized fields, and along the highways gas and tetanus bacilli are especially abundant. Also persons of uncleanly habits whose skin and clothing are badly soiled are much more apt to breed these kinds of infections.

I have found that streptococcal and staphylococcal infections are prevalent in injuries which occur in manufacturing establishments generally.

Mines are remarkably free of infectious micro-organisms except in the stables or in chambers where mules are fed and housed.

These observations suggest at once the proper line of treatment. If in doubt, it is well to use immunizing doses of antitetanic serum as soon as the case is received.

Most careful efforts for obtaining physical cleanliness should first of all be employed. For greasy, sooty members, benzine or spirits of turpentine should first be used around the wound, then painstaking washing of the wound and surroundings with green soap and sterile water, then disinfect with Dakin's solution or formaline solution, or bichloride of mercury solution. Iodine should not be used when soap and water has just been applied. It will not penetrate, but will be very irritating.

The experience in the great war has taught us the tremendous value of careful debridement of comminuted wounds. The excision of all divitalized tissue, or tissue which almost surely will necrose, while a tedious process, is one not to be neglected in any case where the patient's condition will permit it. Also the removal of all foreign matter, stones, dirt, bits of metal, clothing, etc., is absolutely necessary in order to obtain primary healing and prevent suppuration.

The future usefulness of a member, perhaps the life of the patient, in these cases, depends upon the prevention of suppuration or minimizing the grade of infection. After the removal of all foreign matter and careful excision of the borders of the wound to its deepest part, adequate dependent drainage should be provided and the tissues should be brought into such coaptation that no dead spaces remain, or else the wound should be left freely open. Tension in suturing should sedulously be avoided, else disaster is most likely to occur. I think I have seen more instances of serious suppuration occur when wounds have been brought together by tensely drawn sutures, and from tension of the flaps or tissues about the wound than from any other fault in the modern treatment of injuries. This is an error very commonly committed by internes and surgeons who have not treated a large number of such injuries.

When it is ascertained that an individual when he received the injury was exposed to the possibility of infection by tetanus bacillus an immunizing dose of tetanus serum should be given as soon as the surgeon has received the case. The wounds of these cases ought to be left open, not drawn together by sutures, and they should be exposed for several hours a day to direct sunlight or to white electric light.

If there has been a good chance for gas bacillus infection the debridement and disinfection of the torn muscles, and especially the interspace of connective tissue between the layers of muscles exposed by the wound should be most carefully sterilized by one of the chemical germicides, (Dakin's solution, absolute alcohol, methylated spirits, or bichloride of mercury solution) and the wound also left open and treated by white light.

The enthusiastic acceptance of the Carrel-Dakin method of treating infected wounds by most of the American surgeons who worked at or near the front in the late war and its very general employment at present in civil practice make one hesitate a little to recommend any other method in preference to this most efficient treatment.

Comminuted wounds are those especially adapted to the Carrel-Dakin treatment; because it is very difficult to get thorough coaptation of the tissues, and dead spaces are apt to be left. In spite of painstaking excision of devitalized and soiled tissue one may leave some shreds or fragments behind. It is very well known that Dakin's solution rapidly breaks down the devitalized fragments and causes their release from the continguous parts so that they may be discharged with the fluids escaping from the wound. To use a method which fills in the open spaces at the bottom of the wound with a disinfectant solution which will bring away the devitalized tissue with the discharging bloody serum and which enables one to renew the disinfectant every two hours, seems ideal. It *is* ideal when properly employed for these purposes. But one must not forget he is after all treating the *whole individual,* and not the injured member alone, and it requires special training rightly to employ the Carrel-Dakin treatment. The solution must be neutral and it should have the proper quantity of chlorine gas. That requires a skilled chemist to prepare the solution, and it must always be fresh. Unless all this is sedulously provided the Carrel-Dakin treatment is a delusion and a snare. Serious injuries such as major crushes always produce some degree of exhaustion. Rest—physical and mental—is one most important need for rapid recuperation in these cases. The Carrel-Dakin treatment requires frequent changes of dressing. These dressings are usually painful and tedious. The patient soon learns to dread the ordeal of the dressings, so that the prosecution of this method which entails frequent attention takes away the strength of the patient and adds to his exhaustion. Frequent dressings expose the wounded part to the chance of movements of the injured tissues, especially where a fracture has occurred. These movements displace the position of tissues and disturb the healing processes. In short, the method is apt to contravene one of the prime necessities for healing, namely *rest* of the injured part.

On the other hand, free incisions to relieve tension and thorough dependent drainage with large masse dressings, applied, and fixation of the wounded part with a proper splint properly applied, if the preparation of the wound has been carefully and thoroughly done, permit the wound to remain undisturbed for a week or longer if necessary. I have frequently left these first dressings on for two weeks or longer. This gives the wounded part and the patient himself time to recuperate, and rarely fails to overcome the infection if it be a mixed infection, or only staphylococcal. Gas bacillus infections, as a rule, will not be overcome by either method alone—that is to say, not without further operative procedures.

It is evident therefore that *proper modern treatment* requires the constant collaboration of the pathologist with the surgeon. As soon as it is found that a wound is infected a culture should be made from the pus or serum taken from the inside of the wound and subsequent treatment should be according with the findings of the bacteriologist.

A serious gas bacillus infection cannot be overcome by the use of the Carrel-Dakin treatment alone. If the whole of the wounded area be involved in the infection an amputation, if it be a limb involved, must be performed as soon as practicable. It is now well known that the gas bacilli attack muscular tissue especially, and travel along the inter-muscular spaces. If therefore only one muscle be involved it may be dissected out and removed in its entirety, the intermuscular spaces thoroughly disinfected, and the Carrel-Dakin treatment then employed.

Infections by streptococcus hemolyticus, or even a virulent infection of pure streptococci of a lower strain are also most disastrous occurrences. These, I think, require free incisions to relieve tension, dependent drainage of the freest possible kind, very active general supportive treatment, and antistreptococcal inoculations or vaccinations.

These wounds I prefer to treat with Dichloramine-T. The Dichloramine-T should be inserted into every crick and cranny of the wound by means of saturated gauze wicks and the freest possible dependent drainage must be assured.

4. Treatment of the Crushed Part.—As it was said before, surgeons must not forget that they should consider the whole individual in adopting the measures for treatment of the injury. Further, one must not only consider the immediate condition of the patient but bear in mind also the reconstruction period which will follow, both as regards the ultimate cosmetic effect, and the functional usefulness of the injured member.

The early determination of what operation to do in order to restore the member to something like sightliness, and which will make it of the greatest use to the individual under consideration must be met and the matter definitely settled.

Naturally the question of amputation will be a pressing one in many of the cases. The rules I published some time ago in reference to this determination I still regard as sound and I think I cannot do better than to repeat them here:

"Annular crushes (that is to say, when all the tissues of a limb have been crushed through the whole of a limited transverse section of the limb), require amputation.

"When the soft tissues under the skin as well as the bone have been comminuted by a squeeze or pressure of a car wheel, or heavy machinery, even though the skin may not be badly lacerated, an amputation will be required.

"If the bone or bones of a limb be comminuted beyond a distance of 6 cm. and the soft tissues immediately about the bone be badly lacerated, one should amputate.

"Extensive longitudinal and oblique lacerations admit of conservative treatment as a rule, while circular ones are apt to require amputation.

"Circular lacerations involving the chief bloodvessels and nerves as well as the muscles require amputations.

"In estimating the condition of an injury the extensive muscular lacerations should receive less consideration than great injury to an extensive area of skin.

"Compound fractures which sever a large nerve trunk do not require primary amputation; conservatism should always be tried. The nerve may be sutured and spliced if necessary.

"Compound fractures with injury to one system of bloodvessels when there are two, do not require primary amputations. When both systems of bloodvessels are torn amputation as a rule, is necessary. Anastomoses of bloodvessels at the site of a badly mangled limb, may, as a rule, not successfully be done.

"When fractures are comminuted as well as compound, injuries to the soft tissues are much more extensive. Areas of thromboses will be much greater and conservatism be less successful.

"In any given case while it is probable that conservative attempts may save a limb but leave it in a useless condition, or in a doubtful state, it would be best to amputate if the amputation would assure a useful stump, unless the injury be high up in the thigh where the mortality rate of amputation is high.

"The individual and his trade or employment should always be taken into consideration in determining whether the probabilities should weigh for or against an amputation

"Doubtful conservative attempts in cases of very seriously crushed limbs have a larger percentage of mortality than amputations have. This fact should also be taken into consideration.

"In all cases of *doubt,* having carefully considered the foregoing facts, one should always delay the amputation. Conservation is always the proper policy when there is a good chance for its success.

"The first sign of gas bacillus or streptococcal infection in these very doubtful delayed cases should determine an amputation immediately, and the open treatment of the stump afterward."

There will be many doubtful cases, however. These I would feel like treating conservatively as long as the principal vessels or a sufficient number of them to nourish the member were left intact and the nerve trunks were not destroyed.

Free incisions to relieve tension and to evacuate effused blood, and thorough dependent drainage should be provided, after careful cleansing and removal of devitalized tissue. An immunizing hypodermatic dose of antitetanic serum should be given and the part put at rest by the application of some well adapted splint.

For years I have been treating crushed extremities after dressing by suspending them from an overhead, or overbed beam.

The experience of the late war has emphasized the value and comfort of this suspension treatment. The "Balkan frame," I think, has come to stay. The swinging of the limb not only enables the nurse and the patient himself to change his position, and to do the offices necessary to keep his bowels in order and his person clean, without much discomfort, but the method enables one to employ traction in any direction necessary with but little friction, and thus adds to the efficiency of traction or directional methods of treatment.

As fractures, compound and comminuted are usually produced by crushing injuries a consideration of what should be done for the fracture is also a most pertinent one. This, however, opens up a big field and it is not the purpose of this paper to discuss the subject of the treatment of compound comminuted fractures. I shall only say it is still my custom to remove all loose and detached fragments of bone and when the condition will permit, to fix the ends of the fractured bone or bones in close and rigid apposition by a plate applied directly to the fragments themslves.

After more than twenty years of experience in the use of the plate in these cases, which as I said are always infected, I am more than ever convinced of the value and safety of the method. *I do not consider an infected wound a contraindication to the use of a bone plate in compound fractures.*

Septic pneumonias are not uncommon complication in these cases. These patients should be treated in a thoroughly ventilated and sunny ward, and not be allowed to remain in the recumbent and fixed position for any length of time. They should be propped up into a sitting or reclining position as soon as possible and be taken into the outdoor air as soon as practicable.

5. Reconstruction Treatment.—The success of any treatment will be determined by (1) saving of the patient's life and (2) returning him to efficiency.

Rehabilitation is the slogan of the period, rightly so, too, for a surgeon, for his work is certainly not complete nor commendable when he goes no further than bringing a patient to the condition when he may be discharged from the hospital.

For this reason all operative procedures and methods of treatment should be dictated by the thought of what will be best for the individual patient in after years.

Plastic surgery has done marvels, and the field is ever widening. Implantations and transplantations of both soft and bony tissues may now be done with confidence of success. These methods of reconstruction should be used when necessary.

Massage and passive movements are valuable aids and should be employed as early as practicable.

The remarkable success of the Willems treatment of injured, even infected joints, has demonstrated the tremendous value of persistent movements of extremities after injuries. Active, voluntary movements are those which especially count. These should be enforced as early as possible.

The bad effect has been demonstrated so often, and the dicta of surgeons who know is so constant against too early weight-bearing after a bone has been badly fractured, it is hardly necessary to do more than again to lay especial stress on the recommendation always to prevent too early weight-bearing, by the use of crutches and some form of splint, or prosthetic apparatus.

Every well equipped hospital should now have a department well provided with apparatus, and under a skilled supervisor for the rehabilitation of injured members and the restitution of functional usefulness.

Industrial surgery has too long neglected this most essential field. The trend of the times and public opinion will, however, soon compel the institution of proper measures for carrying a man from early disability to complete usefulness.

Treatment will not be considered ended until the man in industrial life who has been seriously injured is sent back in a condition to follow his former trade, or *some trade* which will prevent him being a burden on the community.

FEET AND ARCHES.

Tetralogy of Conditions, Ailments and Distortions for Diagnosis Records.

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San Francisco.

In response to numerous requests from colleagues for the information and classification in this paper it is presented to call attention to some facts about feet that should be more generally understood. The data from which this information was constructed were gathered over a period of many years as United States Examining Surgeon, and as the Medical Examiner, Consulting Surgeon, and Adjuster for a large number of insurance organizations. As presented in this paper it is the same as taught to Company and Medical Officers by the writer when in recent military service.

This paper suggests a standardization of terms **to be used in the examination** and diagnosis of ailing feet. To say that a foot is flat, or that an arch is broken may convey one meaning to one person and an entirely different construction may be put upon it by another. On the other hand, to say that an arch presents a distortion of the first degree, second degree, third degree, or fourth degree, accurately describes the condition. The use of the term "degree" is naturally applied to an arc and in this classification it is as descriptive as when the word "degree" is applied in describing a burn.

The great necessity of keeping the feet of both civilians and soldiers in good condition will be passed over as generally conceded. However, it might be well for all members of the profession to remember that the recruiting service of the Army demonstrated that there is in this country a very wide field for the application of special knowledge of the feet.

The first consideration in the study of feet is to understand that there are differences in normal feet. For purposes of accurate description and standardization of the terms applied to normal and ailing feet, the following classification is suggested as a foundation to work upon. It is exceedingly simple, easy to understand and easy to memorize: it saves time and, once understood, it is vividly descriptive.

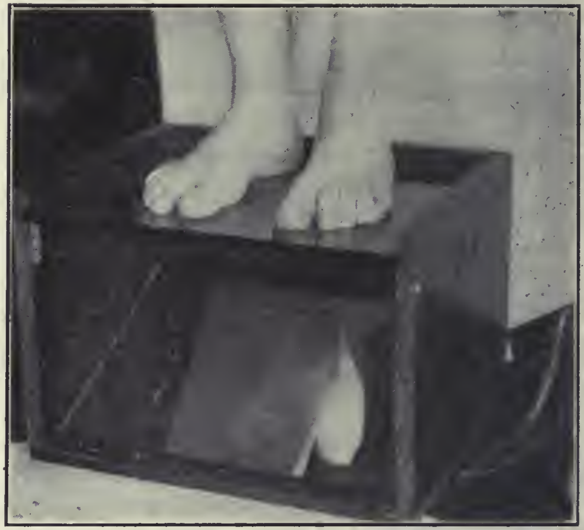

Fig. 1—Normal feet, third degree, on reflector box.

Four degrees of difference in normal feet are described. There is a tetralogy of conditions, ailments, and distortions applicable to the entire subject of feet and it is carried all through this classification.

The equipment necessary to examine feet for purposes of study up to this point consist of 1 table 18″x24″ and about 15″ high; 1 stool 15″ high, 1 pair of dividers, and a one-foot rule. With this equipment every pair of feet you get a chance to look at should be examined and a study made of the general differences in feet.

The degrees of difference in normal feet are determined by the distance of the tuberosity of the scaphoid from the base line stood upon. The tuberosity of the scaphoid is readily located by placing one thumb, pointing towards the toes, below the inner malleolus, and the other thumb resting against the tip of that thumb, but pointing toward the sole. Rehearsing this procedure a few times will demonstrate the ease and accuracy with which the tubercle of the scaphoid can be located. Under the thumb pointing toward the sole, the tuberosity of the scaphoid is made out by very gentle palpation. After the tuberosity is located the skin over it is marked with a dot, made by a moistened indelible pencil.

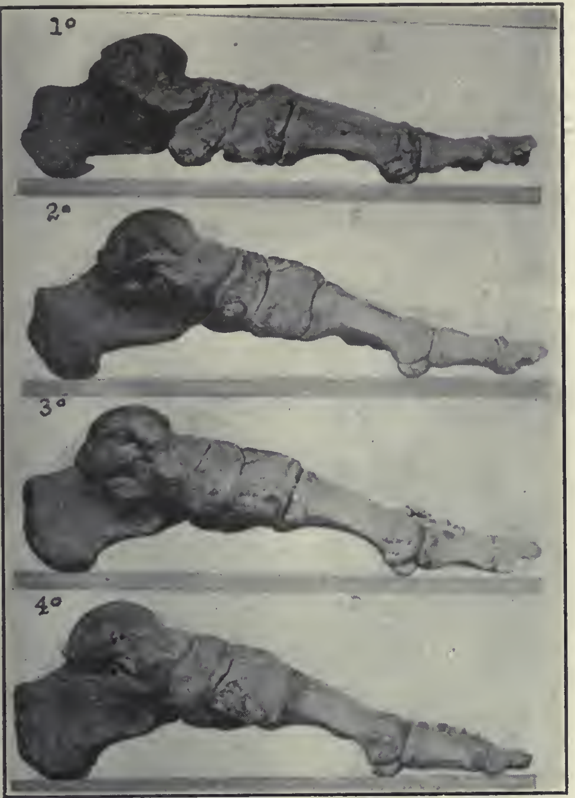

Fig. 2—Normal feet showing four degrees of difference.

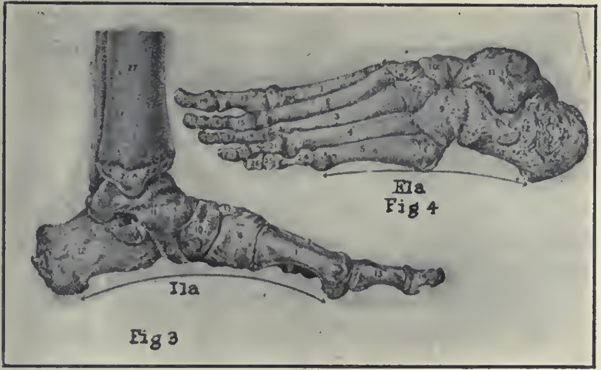

Fig. 3—Internal longitudinal arch (Ila); Fig. 4—External longitudinal arch (Ela).

The measurement is taken as the patient stands erect with body weight equally distributed to both feet. When the location of the tuberosity is marked, a compass or divider is opened, one end resting very lightly against the mark on the skin, the other end resting on the base line stood upon, the distance between the two points of the compass deciding to which degree the foot belongs. (Figure 1).

Normal feet are described in four degrees of difference (figure 2):

1st degree—Tuberosity of scaphoid up to ½ inch above base line.

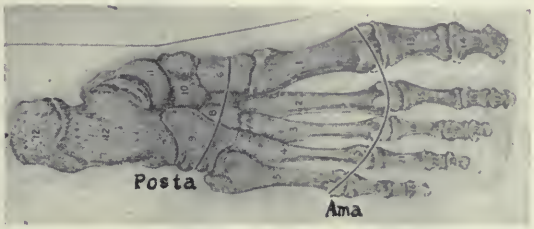

Fig. 5—Anterior metatarsal arch (Ama), and posterior tarsal arch (Posta).

2nd degree—Tuberosity of scaphoid up to 1 inch above base line.

3rd degree—Tuberosity of scaphoid up to 1½ inch above base line.

4th degree—Tuberosity of scaphoid up to 1½ inch above base line.

Four normal arches or curved areas of a foot are described:

1st—Internal longitudinal arch, Fig. 3 (Ila).

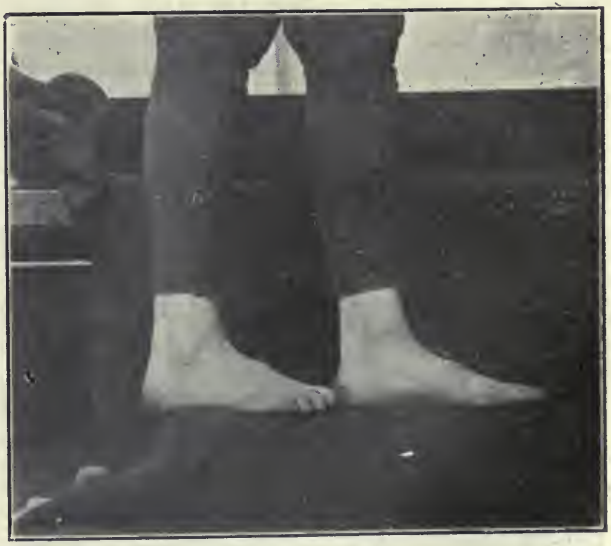

Fig. 6—Second degree Ila distortion and luxation middle cuneiforms R. & L.

2nd—External longitudinal arch, Fig. 4 (Ela).

3rd—Anterior metatarsal arch, Fig. 5, A (Ama).

4th—Posterior tarsal arch, Fig. 5, A (Posta).

The "words" in parenthesis represent the first letters in each word and make excellent mnemonic abbreviations for accurate description and rapid record of the conditions presented.

Distorted arches are described in four degrees of difference, and can be readily learned by a careful study of feet and outline tracings.

The terms "broken arch" and "flat foot" are misleading and confusing, and should be applied only to feet that are "flat" or arches that are "broken." Such terms produce decided psychological depression upon patients, especially upon soldiers. It appears more scientific to state the degree to which an arch is distorted as it more correctly describes the actual condition and at the same time indicates the severity of distortion.

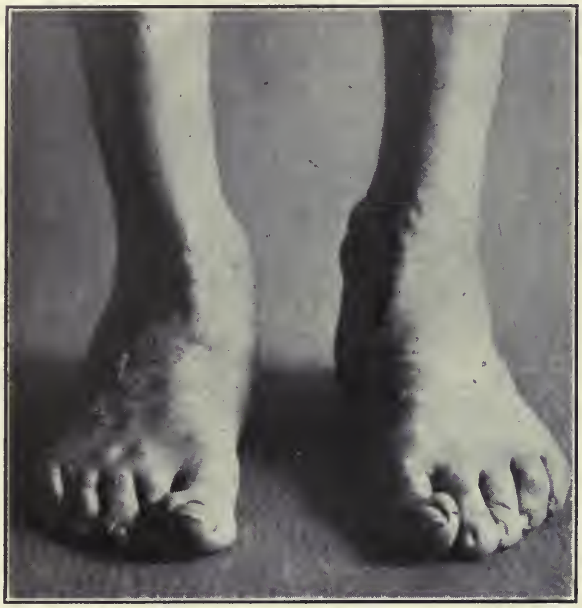

Fig. 7—Ila distortion, fourth degree, rigid.

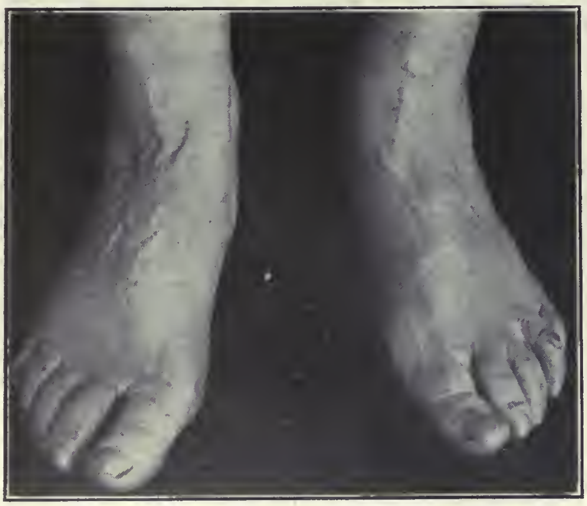

Fig. 8—Swollen, tender, and painful feet from Ama distortion, second degree.

For that reason arch distortions are described as:

Distorted longitudinal arch—First degree; distorted longitudinal arch, second degree, (figure 6); distorted longitudinal arch, third degree; distorted longitudinal arch. fourth degree, (figure 7).

The changes which occur to produce each of these conditions can be carefully studied in flexible distorted feet.

Ingrowing toe nail (Ign): Four degrees of difference: First degree—Nail turned in at edge or edges, (figure 7, right). Second degree—Nail turned in to greater depth, (figure 7, left). Third degree—Nail turned in to cause pain. Fourth degree—Nail turned in, inflamed or infected.

Bunions, (B), Four degrees of difference: First degree—Small, not painful. Second degree, large, not painful. Third degree—Any size, painful. Fourth degree—Any size, inflamed.

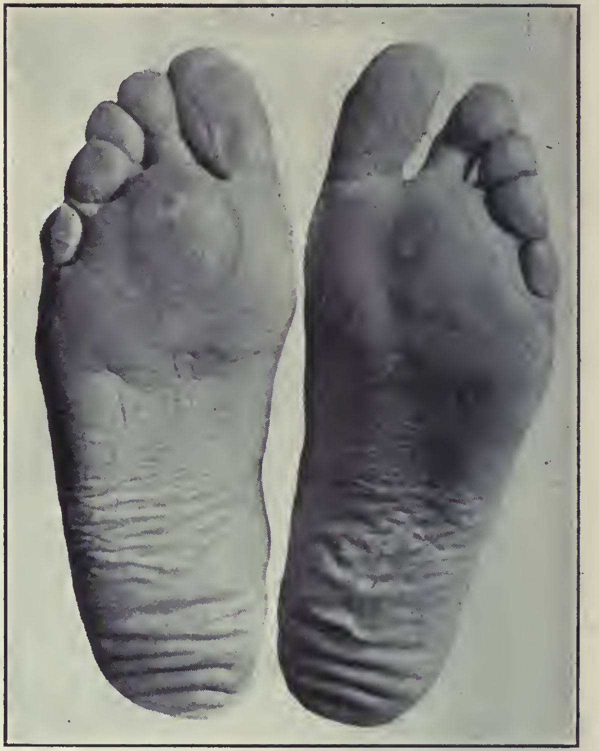

Fig. 9—Right, mass callus and Ama distortion, third degree. Left, discrete callus and Ama distortion, second degree.

Corn (C) Four degrees of difference: First degree—Faint mark on skin from friction or pressure. Second degree—More pronounced mark from friction or pressure. Third degree—Calloused corn area. Fourth degree—Heavy calloused area, commonly called "seed corn." (Fig. 8).

Callus. Four degrees of difference First degree—Protective callus. Second degree—Pathological, discrete callus, under head of distorted metatarsal, (figure 9, right). Third degree—Pathological, mass callus, under head of two or more distorted heads of metatarsals, (figure 9, left). Fourth degree—Inflamed or ulcerated callused areas or calluses complicated with inflamed papillomas.

Papilloma (Pap). Four degrees of difference: First degree—Indicates papilloma is present. Second degree—Indicates papilloma is tender. Third degree—Indicates papilloma is painful. Fourth degree—Indicates papilloma is inflamed or ulcerated.

Cramped toes (CT) are decribed in four degrees of difference, depending upon degree of deformity present. (Figure 9).

Toes overriding (TOR) are described in four degrees of difference, depending upon degree to which toes override. Fourth degree represents complete overriding. Expressed in fraction, 4/3-2° indicates that the fouth toe overrides the third toe half way; 3/4-2° indicates that the third toe overrides the fourth toe half way. (9 Rx3/4.) (Left 2/3/4). (Fig. 7). Right 2°. Left 1°.

Club-Nail (CN). Four degrees of difference: First degree—Ordinary small clubbed nail, part of nail normal. Second degree—Thick small clubbed nail. Third degree—Greatly hypertrophied clubbed nail. Fourth degree—Thickened or hypertrophied and inflamed or ulcerated.

Hammer-Toe (HT). Four degrees of difference: The fourth degree representing the most marked degree of hammer toe.

Blister, or Vesicle (V). Four degrees of difference depending upon the size of the vesicle: First degree—Up to ½ inch in diameter. Second degree—Up to 1 inch in diameter. Third degree—Up to 2 inches in diameter. Fourth degree—Up to 3 inches in diameter.

As mentioned above this list forms the foundation for a classification and method of accurate examination and description of feet.

The feet deserve the special consideration of every family physician if we are to have a nation of men and women with good feet to stand upon, to work upon, to play upon, or to fight upon. The feet deserve far more special study than has yet been bestowed upon them. Their ailments constitute a class of time-consuming practice which, as a rule, is not interesting to the operating surgeon. They calling for the application of non-surgical treatment and much time. Many colleagues have come to me after lectures and confessed that they knew little or nothing about the examination, diagnosis and treatment of ailing feet.

It is my desire to spread what information I may have about feet to those who care to make use of it. Some of the methods of examination, diagnosis and treatment are said to be original. In any event they are painless and by their application it is possible to rebuild broken arches in a very large percentage of the cases, so that the feet will sustain the body without the necessity of splints, which often do more harm than good.

THE SO-CALLED INTERSTITIAL GLAND IMPLANTATION. TO WHOM IS THE CREDIT DUE?

G. Frank Lydston, M.D.,
Chicago.

Be it understood at the outset, that the term "interstitial glands" is euphemistic and of newspaper-science origin. The glands in question are the reproductive glands. Certain cells in the reproductive glands were termed *glande interstitielle,* by Bouin and Ancel, and "between cells" by Leydig. They are supposed to secrete hormone, or internal secretion, but are not true gland cells.

The notion that certain glands of the body bear a very important relation to its nutrition, and particularly to bodily energy and endurance, is not new. Over three decades ago the venerable Brown-Sequard performed certain experiments upon himself by injecting into his tissues the juices of glands obtained from the lower animals. He reported an extraordinary increase in his vigor and endurance, both mental and physical, and was compelled, willingly or not, to father his so-called "elixir of life," a rather mean advantage to take of one of the world's greatest and most venerable scientists.

In 1849 Berthold, of Göttingen, transplanted the reproductive glands of fowls from their normal location to the abdominal cavity and showed that the normal sex characters of the birds were preserved through the "effect upon the blood." He builded wiser than he knew, for he proved the existence and significance of what we now recognize as an "internal secretion" of probably the most important glands of the body.

As far back as 1899, Forel, in the Italian Biological Archives, claimed that the implantation of a reproductive gland in any part of the body had very profound effects. Since Berthold's day many experimental transplantations and autotransplantations of glands from the living to the living have been performed, with no resulting increase in our knowledge save that such transplantations were practicable.

In 1912 Hammond and Sutton reported a case of sex gland transplantation, the gland being taken from a subject who had just died of hemorrhage from rupture of the liver. This was kept in cold salt solution for some hours, and then transplanted upon a patient who had just had one of his own glands removed for cancer. The object of this transplantation was merely to obtain a psychic effect upon the patient, and no scientific observations were made. Be it remarked, that the transplanted gland in this case, removed from a patient who had just died, was precisely the same as if it had been removed from a living subject under chloroform. Despite the fact that no scientific observations were made or aimed at, this was the first reported case of deliberate transplantation of a human gland, for which America should have due credit. Several other Americans have done work on this or collateral lines for which they have been given due credit in my various writings. My first series of articles in the *New York Medical Journal*, October 17, 24 and 31, and November 7, 1914, contained a bibliography comprising forty-six references, probably all which at that time were worthy of note.

Since the formulation of the theory of internal secretions some years since, an excellent foundation has been afforded for gland work. There has been, of course, almost insuperable difficulty in obtaining glands from the living subject. Noting the work of the late Dr. J. B. Murphy and of Carrel, however, I thought of a way to overcome this difficulty, these experiments having shown, first, that somatic or bodily death did not imply tissue cell death, the cells on the contrary retaining their vitality for a considerable period after the death of the subject, and for a prolonged period if the tissues were frozen. Carrel made many experiments in implantation of glands upon animals which were not brilliantly successful. He did, however, try to formulate a method for the transplantation of new ordinary secretory glands to meet certain indications. but apparently had no thought of the implantation of internal secretory glands for the purpose of obtaining the effects of secretions, which consideration, of course, would have been of no importance in the case of the kidneys, the glands with which his experiments were particularly concerned.

Ever since the publication of Brown Sequard's experiments—then regarded as fantastic—I had entertained more than a suspicion that the venerable Frenchman was not as foolish as some believed. The formulation of the internal secretions theory, and the comparatively recent establishment of their important relations to the welfare of the animal body, convinced me that there was a germ of truth in Séquard's observations and that there was an underlying principle greater than he ever imagined. I therefore determined to conduct some experiments to "prove up." Mindful of the fact that the vitality of the component cells of the various tissues and organs is preserved after bodily death, I determined to experiment with glands taken from a healthy dead body, preserving them by refrigeration as long as might be necessary. I decided to use the reproductive glands with the firm belief that their hormone or internal secretion was the most important in the entire cycle of internal secretory glands, comprising such glands as the thyroid, the pituitary, the suprarenal and others.

With no thought of heroics, and impelled by the obvious practical facts, 1st., that it was hardly fair to subject anyone else to whatever dangers the experiment might involve, and 2d., that if I asked one of my professional friends to perform the operation, I would lose the opportunity of being the pioneer in the field, I resolved to perform the experiment upon myself. This I proceeded to do on January 16, 1914, using material taken from an apparently healthy subject, eighteen years of age, dead seventeen hours. The material was put in a jar of sterile normal salt solution and stood outside of my office window for seven hours prior to the operation. The operation was performed with the assistance of my then associate, Dr. Carl Michel, now in the Public Health Service in San Juan, Porto Rico. Local anesthesia was employed, and a single gland implanted.

On the eighth day the implantation appeared to be a failure, as the wound had not closed completely and there was secretion exuding. I therefore asked Dr. Michel to remove the implanted tissue. To my astonishment the gland split in two, half of it coming away in the forceps, and the other half remaining firmly attached to the tissues in which it was embedded. I was still more astonished to note that the portion removed was unquestionably living and covered with an abundance of new blood vessels, the separation of which from my own tissues produced free breeding. The embedded half of the gland was allowed to remain. It gradually absorbed but did not entirely disappear until about the end of a year, during which time I had abundant opportunities to note the physiological effects.

Since the foregoing operation upon myself I have performed a considerable number of implantations upon both sexes, in all of which I have made careful observations of what I believed to be the effects of the internal secretions of the sex glands upon the human body.

The more important of my conclusions are as follows:

1. Therapeutically successful total or partial implantation of human reproductive glands in both male and female is practicable. So long as a vestige of the implanted gland remains hormone is formed and absorbed, producing effects that endure even after complete absorption has occurred.
2. Glands taken from a healthy dead body at any reasonable time prior to the beginning of decomposition are suitable material and, if implantation succeeds, are of therapeutic value equal to those taken from the living body.
3. The hormone of the glands in question is stimulant, nutrient, tonic and reconstructive, and should be beneficial in many forms of chronic disease.
4. The development of senility can be retarded and longevity probably increased by hormones administered by gland implantation. In one case the previously grey hair upon the arms and breast and the almost entirely grey eye-brows and beard became noticeably darker within a few weeks.
5. Gland implantation is of marked benefit in cases of defective sex development of various kinds.
6. It apparently is valuable in certain obstinate forms of chronic skin disease, notably in psoriasis.
7. It appears to be of great value in arteriosclerosis, when not too far advanced.
8. It thus far has been very effective in anemia.
9. Gland implantation is quite uniformly effective in increasing physiologic efficiency with all the benefits accruing therefrom.
10. Several cases coming under my observation and submitting to gland implantation have had apparently extraordinary results, notably several cases of imperfect sex development with feminine attributes in the male, and in cases where the subject had been rendered thoroughly inefficient in every way as a result of injury or disease.

11. It is not necessary that the implanted gland should remain permanently in order to secure beneficial results.

Referring to the effects of implantation upon the skin, one experimental case of severe extensive psoriasis of long standing, that was dying from a complication of diseases resulting from alcoholism, was very remarkable, the skin disease entirely disappearing within two weeks. The improvement in the condition of the blood in this case was little short of marvellous.

The conclusion at which I finally arrived was that there was nothing miraculous about the effects of gland implantation. The results simply proved the powerful nutritive and stimulant effect of the gland hormone upon every cell of the body, and especially upon the internal secretory issues of every important hormone-producing gland. In brief, it is a "cell food." With myself, gland implantation long since passed the experimental stage.

As to permanency of results, I have a case dating back over five years and several from two to four years, in which the results not only were remarkable, but have been sustained. In at least two of these cases the implanted glands still survive.

In my papers published in the *New York Medical Journal* on the dates already mentioned and later in other medical journals, also in my volume upon the subject of gland implantation, published in 1917, I presented an extensive series of studies and microphotographs of sections taken from glands which had been implanted upon the human body and removed at various intervals. Some of my most remarkable sections and photographs were taken from a male gland taken 30 hours after death, refrigerated for four days and implanted upon the body of an insane female, sixty years of age, the operation being done in the hope that some benefit might be derived from the action of the hormone upon the brain. At the end of four months and nine days, the patient being a bit fussy over the presence of the small tumor formed by the implanted gland in the abdominal wall, the gland was removed under local anesthesia. The microscopic sections plainly showed remnants of secreting tubules, with an abundance of new bloodvessels, and an abundant proliferation of the hormone-producing interstitial connective tissue cells or cells of Leydig. This was the first proof that new bloodvessels formed in implanted glands.

I later performed some implantation experiments upon fowls, in one instance implanting a gland from the living male upon the abdominal wall of a pullet from which it was removed at the end of seventy-five days. As in the case just previously mentioned, the sections showed new bloodvessels, with an abundance of normal blood corpuscles, and something which hitherto had not been demonstrated by anyone, and, so far as I know, has not since been demonstrated, a beautiful and definite picture of the hormone-producing interstitial cells, a microphotograph of which appears in my treatise already mentioned. Some of my sections showed that new bloodvessels containing normal blood were formed by the eighth day after the implantation of the refrigerated organ taken from a dead body. The book contains a series of 25 microphotographs of sections taken from glands which had been implanted and removed, and six photographs of the gross specimen already alluded to, removed four months and nine days after implantation. If there are extant any other illustrations of this kind, I do not know of them, and any which may now exist certainly have been made since mine were published.

Apropos of the recent discussion regarding the merits of the claims of Voronoff, of Paris, that he is the discoverer of the work herein described, the widespread publication of which claim necessitated the writing of this article, I wish to observe:

1. Voronoff's name does not appear in the practically complete bibliography on gland implantation which I published in 1914, which bibliography included every bit of work bearing, even collaterally, upon my experiments that I could find.

2. I never heard the gentleman's name until it appeared in the public press of this country, and am not aware that he has at any time published any observations upon gland implantation in a dignified manner in the medical press.

3. It is a self-evident proposition that Dr. Voronoff is more mindful of the publication of scientific matters in the secular press than he is of such matters appearing through professional channels. He was especially quick to note in the public press that Dr. L. L. Stanley, of San Quentin prison, California, had performed ten gland implantations. Voronoff showed lively interest in this work, by sending a cablegram to Dr. Stanley, congratulating him upon his success with his (sic) (Voronoff's) method. As Dr. Stanley promptly replied through the medium of the *United Press* to the effect that the method which he was using was that of Dr. Lydston, of Chicago, who had performed the operation nearly six years ago, it would seem that Voronoff's congratulations fell rather flat.

As I write, I have before me a telegram received from Dr. Stanley, October 19, 1919, in which he states as follows:

"My ten cases of gland transplantation were done according to your technic, and after close study of your book and reports in the *Journal of the American Medical Association*. No originality was claimed by me. In my only interview to the San Francisco Bulletin, Tuesday, and in interviews of my assistant, full credit was given you. I pointed out that Voronoff was far behind the times and that you had long preceded him. With my permission you reported my first case. I suggest that you give this telegram to the papers."

There also lies before me the official prison records and hospital chart of the first case operated by Dr. Stanley about thirteen months ago, with the correspondence between Dr. Stanley and myself relative to the case. The case was operated upon by my method, and I myself published it, giving Dr. Stanley due credit, in the *Journal of the American Medical Association*, May 31, 1919.

James Thompson, the subject, was a moron, under sentence from one to seven years for burglary. He was twenty-four years of age, mentally defective and physically inefficient. Glands taken from a subject just hanged for murder were planted upon Thompson with results which, according to the reports received by me from Dr. Stanley at various periods following the operation, were very remarkable, to say the least. At last accounts Thompson was so far improved that he was sent to a roadmaking camp something like two hundred miles away from the penitentiary.

Noting Voronoff's sensational newspaper contributions, one of two conclusions is inevitable, namely, that he either does not read scientific publications, and therefore knows nothing of the literature of the subject in which he is posing as a pioneer, or he gives no credit to the workers in science who have preceded him along similar or collateral lines.

Announcement of my experiments appeared in the *Bulletin of the Chicago Medical Society,* March 7, 1914. At various times within the last few years articles by me upon the subject have appeared in the *Journal of the American Medical Association,* with which publication every well read medical man in Europe in familiar.

Incidentally, if Dr. Voronoff had kept more thoroughly in touch with the scientific literature, he would have found that he was merely burrowing at the foundations of a scientific structure which already was built. The end and aim of animal experimentation is to lead to experimentations or clinical work upon the human subject. As the work upon the human subject already had been done, the gentleman's observations upon the senile goat would seem to be supererogation.

If my distinguished French confrére would read scientific literature with half the zeal with which he reads the secular press, it might help matters some.

Taking their cue from the reports made to scientific societies and from regular scientific channels, the newspapers of this country in March, 1914, gave a pretty thorough presentation of the at that time startling surgical novelty of gland implantation as presented by me to my medical brethren.

We perhaps can forgive Dr. Voronoff for not keeping in touch with the secular press of America six years ago as closely as he evidently does at the present time, but can we forgive him for not reading the public press of Paris? An entire column was devoted to my work in *Le Matin,* Paris, March 23, 1914. It was similarly noted in *Le Gaulois,* Paris, March 25, 1914, and in several other Parisian papers. It also appeared in the *Journal de Rouen,* France, March 24, 1914.

That there was no lack of opportunity for Voronoff to have become acquainted with what was doing in the field of gland implantation in America through European scientific channels, is shown by the following bits of correspondence which lie before me, namely, acknowledgments of the receipt of my work upon gland implantation: From the Rector of the University of Bologna, July, 1918; from the Chief of the Military Medical Service, of France, July, 1918; from the Director of the General Military Medical Service of Rome, Italy, September, 1918; from the Director of the Hospice de la Salpétriére, Paris, July, 1918; from the Secretary of the Royal University of Turin, Italy, July, 1918; from the Director of the University of Madrid, July, 1918.

Just a brief quotation from the article in *Le Gaulois,* already alluded to: "America, the country of audacious surgical experiments, gives us some hope for a cure of the insane. It is Dr. G. Frank Lydston, of Chicago, who is the author of the promising discovery. Assisted by one of his colleagues, Dr. Leininger, he recently grafted into insane persons glands taken from cadavers. He writes of the action of the secretions of these glands after their transplantation, etc., etc."

I have in my possession under the date of June 10, 1918, the acknowledgment of the receipt by *Paris Medical* of an article written in French by my friend, Dr. Luria, of Chicago, containing a report of three of my early cases. In this acknowledgment the editor agrees to publish the article. Whether he has thus far done so, I cannot say. It would be interesting to learn what connection, if any, there is between Voronoff's remarkable newspaper exploits and the fact that a French translation of a report my work was sent to *Paris Medical* in care of the Faculté de Medicin, and was received by that journal seventeen months before.

Had Dr. Voronoff followed the literature carefully, he might have saved himself the trouble of the rejuvenation of the old goat, as he would have found in my work the report of an experiment on a capon, three years old, which was remarkably restored by gland implantation.

As to experimental transplants from the lower animals to man, if he had followed the work of Dr. Robert T. Morris, of New York, he would have found that a decade or so ago, work of that kind had been done in America.

As to Voronoff's suggestion that the bodies of accident victims should be made available to the profession, and that hospitals should be built in popular centers, to which the dead victims of railroad or street accidents can be brought immediately after the accident in order that glands may be gathered and cold-storaged for the purpose of implantation, certain of my conclusions published in 1914 form rather interesting reading. For example: "Opportunities should be sought in the human subject for histologic study of implanted glands at varying periods after implantation, to determine in what degree both generative and internal secretion gland tissues endure. Every effort should be made to so amend our laws that viable tissues of all kinds, notably internal secretory glands, shall become available to science. Legislation and public sentiment should favor scientific research. Between the antivivisectionists, on the one hand, and popular reverence for the dead human body, on the other, we are in sore straits. Why should there be a waste of material which, if properly used, possibly might add so much to the health, happiness, efficiency, and even to the longevity of the human race?"

FURTHER OBSERVATIONS ON A NEW METHOD FOR THE IMMEDIATE STERILIZATION AND CLOSURE OF CHRONIC INFECTED WOUNDS OF BONES AND SOFT TISSUES*

W. Wayne Babcock, M.D.,
Philadelphia.

In June, 1918, we reported 64 cases of chronic osteomyelitis treated at U. S. General Hospital No. 6, Fort McPherson, Atlanta, Ga., by a method of immediate disinfection and closure. Sufficient time has not yet elapsed to fully determine the efficiency of the method and certain dangers and technical details were not understood. Of chief importance is the mortality of the procedure. In our series of 64 cases, one sudden death occurred on the operating table; and in the hands of our associates two additional deaths occurred in which there was a question as to whether the fatalities were due to the anesthetic, or to the treatment used. At the U. S. General Hospital at Fox Hills, Staten Island, three deaths occurred in 29 operations, for one of which, at least, the procedure seemed to be responsible. From two of the bodies of these patients small quantities of zinc were recovered from the viscera, suggesting metallic poisoning; but a control examination of the liver of a patient who had died of empyema and had not had the treatment, showed traces of zinc, confirming other evidence that this metal in minute quantities is a common ingredient of the human body. While the autopsy did not, therefore, reveal the cause of death, clearer light was shed on the subject by a few animal experiments. The injection of less than a drop of a saturated solution of zinc chloride into the marginal ear vein of a rabbit was found to produce almost instant death. If, however, the base of the ear was compressed by the fingers, so as to interrupt the venous circulation during and for two minutes after the injection, no apparent harm resulted. Likewise the injection of three minims of a saturated solution of zinc chloride into the saphenous vein of a dog produced no symptoms, provided the chemical was prevented from immediately entering the general circulation by the temporary application of a tourniquet. By slowly injecting intravenously in dilute solution quantities of zinc chloride were tolerated without symptoms, which when rapidly injected in concentrated form, quickly killed the animal. By previously mixing the salt with a sufficient quantity of the blood of the animal, the toxic action of the zinc chloride, on intravascular injection, also was largely prevented; probably because the chloride is quickly converted by the blood into a relatively inert and insoluble compound.

We have concluded that the forcible injection of a strong solution of zinc chloride into bony sinuses may lead to the penetration of small bloodvessels and such a sudden entrance of the caustic into the blood stream that the central organs are reached before the chloride can be neutralized, with a result that the patient may develop very serious, or even immediately fatal symptoms. This danger may be avoided by keeping a proximal tourniquet applied during the injection of the zinc chloride solution and for five minutes thereafter. If the sinuses involve parts of the body, such as the pelvis or throat, that cannot well be shut off by a tourniquet, the sinuses should be carefully packed with small pledgets of cotton moistened with the zinc solution, and not forcibly injected. That these precautions are efficient is indicated by further experiences: At Fox Hills, after a temporary abandonment, the method was resumed under the direction of Captain Craigin who reports a total of 80 or 90 cases treated without further accident. At the U. S. General Hospital No. 6, at Fort McPherson, in association with Captain W. L. Thornton, we have now used the method on 250 cases of bone infection without further mortality that could be attributed to the chemical used. In the 250 cases there were two deaths—one, the case previously mentioned, in which under spinal anesthesia the patient suddenly developed respiratory or circulatory failure after the forcible injection of a pelvic sinus with zinc chloride, was, with the greatest difficulty, revived by cardiac massage and other measures, and died two hours later. In this case the evidence pointed to the zinc chloride as the causal factor. In the second case the patient collapsed and died four hours after the operation and was found to have an unsuspected metastatic purulent cerebrospinal meningitis, secondary to the extensive chronic osteomyelitis of the femur.

A second danger lies in the operator's failure to excise all chlorided tissues before closing the wound. Tissue left impregnated with the caustic in close proximity to large bloodvessels may by erosion give rise to very serious secondary hemorrhage.

It is believed that if the precautions indicated are carefully followed, this method of sterilization does not add to the danger of the operation, while it greatly reduces the later morbidity. Further experience has emphasized the importance of rest and very careful support and accurate fixation in the after-treatment. In two cases the weakened bone fractured from lack of sufficient support. In the cases of complete fracture, the progress was much better where the fragments were well immobilized. Much of the success of the method, therefore, depends on careful after-treatment, and we are greatly indebted to Lt. Cecil E. Warde for his skill in the post-operative, orthopedic treatment of our cases.

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* Read before the twenty-ninth annual session of the New York and New England Association of Railway Surgeons, held at New York City, October 20, 1919.

Irrigations or injections into the wound should not be used, and drains as a rule are to be avoided in the after-treatment. The patient should remain in bed the first two weeks, and continuously wet mildly antiseptic dressings should be employed. Dakin's solution we have found harmful in these closed cases. In our experience the method is infinitely superior to the other forms of treatment with which we are familiar. None of the patients had been treated less than seven months before the method was tried, and most of the patients had received months of Carrel-Dakin treatment, and all had had from one to nine previous operations.

We would say that chronic bone sinuses are successfully closed in from 70 to 94 per cent. of the cases, dependent upon the thoroughness of the treatment, the character of the lesion, and the degree of destruction of the adjacent soft tissue. Curiously enough, we found secondary infections from operating on gun-shot fractures that had been completely healed for two months, more troublesome than infections after this method was used to tightly close sinuses of bone frankly suppurating at the time of operation.

The method, which is especially adapted for the treatment of osteomyelitis, septic compound fractures, chronic abscesses and sinuses, consists of four procedures carried out in one operation under anesthesia, as follows:

1. *Immediate chemical sterilization* of all sinuses and wound surfaces by the injection and application of a saturated solution of zinc chloride.
2. *Delineation of infected areas* by the injection of an ethereal solution of methylene blue.
3. *Mass excision of the entire area of infection.*
4. *Wound closure* with the obliteration of all dead spaces.

DETAILS OF TECHNIQUE.

1. *Skin Preparation*: If possible the wound area should be prepared by daily shaving, washing with soap and water, removal of scabs and crusts, and the application of 2 per cent. yellow oxide of mercury ointment for three days preceding the operation.

2. *Wound Sterilization*: On the operating table, the skin is (a) thoroughly scrubbed with "B" solution (Liquor cresolis compound 2, turpentine 10, and gasoline 88 parts). (b) Painted with 3 per cent. tincture of iodine. (c) Sterilized by a saturated chloride of zinc solution, thoroughly injected under pressure into all sinuses and cavities, supplied to all unhealed and granulating surfaces, and rubbed over the scar and skin adjacent to the wound. Five minutes are allowed for the penetration of the zinc solution, and great care is taken that every recess of the wound is reached. As previously indicated the injection should be made only after interrupting the circulation of the part by the use of a tourniquet.

3. *Color Delineation*: The following antiseptic staining solution is then thoroughly applied to all eroded surfaces, and injected under pressure into all cavities and sinuses:

Saturated Alcoholic solution methylene blue	20
Caustic Potash	3
Phenol	5
Ether to make	100

As soon as this solution has evaporated, the exposed granulating surfaces are left blue-black, dry, bloodless on manipulation, and sterile. If a section is made through the sinus, it will be found that the coloring has penetrated to a depth of one to three millimeters. Outside of this is a much wider zone of a vascular, greyish white tissue, that has been sterilized and devitalized by the zinc chloride. (Even sequestra removed from deep bone cavities may produce no growth on culture media.)

4. *Excision of Infected Area*: The entire field is again painted with tincture of iodine, and a very free skin incision made, so planned as to permit later closure and to surround and be well outside of all scars and sinuses, which are to be excised, as nearly as possible, *en bloc*. The instruments are now changed; the skin margins are well separated from the adherent underlying tissues by traction with sharp retractors, and dry towels or gauze clipped in position to protect all skin margins. The incision is then deepened to the bone; the periosteum is freely incised and separated from the bone, retracted, protected by gauze or towels; and, beginning some distance from the disease, with sharp chisels the infected bone is freely excised with the attached overlying skin, scars, and sinuses. Care is taken not to completely divide the bone, and to freely expose healthy marrow cavity well beyond the diseased area.

A blue color remaining indicates that all infected bone has not been excised, and the excision is to be continued. The operator should use very sharp knives, gouge and chisels, and work outside the septic focus rather than with curettes, which tempt one to work from within out. If possible, all soft tissues and bone should be removed to a distance of at least one centimeter external to the blue coloration. The bone incisions are so placed as to leave smooth surfaces with no holes, gutters, cups, or pockets, that will remain as "dead" spaces when the soft tissues are closed; and the incision should leave only well vascularized bone and soft tissues free from bone chips and splinters.

Wound Closure: Care is taken that all chlorided tissue has been excised. The muscles and soft tissues are sufficient freed from the skin and from each other to fit into the bone defects. Bleeding is carefully controlled with the smallest possible amount of plain catgut. Plain catgut sutures are used to unite the deeper tissue layers, and the skin is closed with silkworm gut. Only a dry technique is to be employed. Any excess of zinc chloride may, if necessary, be neutralized by a sterile ten per cent. solution of sodium bicarbonate. This is rarely necessary. Voluminous wet and antiseptic dressings are applied until tissue reaction has subsided. For this purpose we use

Solution C:—

Chloral hydrate	1,
Alcohol (95%)	10,
Glycerine	25,
Sat. sol. boric acid	65.

This is used to moisten the dressings every two to four hours, until all inflammatory reaction has subsided, and healing is complete.

Blood Pressure in Operative Surgery.

Before every surgical operation, a physical examination should be made including an estimation of the blood pressure.

During operations, blood pressure tests provide an invaluable index to surgical shock, hemorrhage, and anesthetic overdosage.

The sphygmomanometer should be used not only in selected cases but also as a routine measure. In this way we shall become accustomed to normal variations in the blood pressure during operations and be able to detect the signs which indicate vital changes in the patient's condition.

The Fowler position should not be used after an operation until the circulatory condition has been proved to be satisfactory by blood pressure examinations.—Albert H. Miller, in *The Journal of the American Medical Association.*

DECOMPRESSION OF THE SPINAL CORD IN TUBERCULOSIS OF THE SPINAL COLUMN*.

F. C. Floeckinger, M.D.,
Taylor, Texas.

All surgeons agree that in an acute attack of appendicitis, as soon as the diagnosis is made, operation should be performed. This problem has been settled. Is it not a fact, that all of us have seen cases, presenting symptoms of kyphosis or lordosis, or psoas abscesses, ankyloses, and other result of detruction of joints and bones and, worst of all, cases of paresis, either monoplogia or paraplegia?

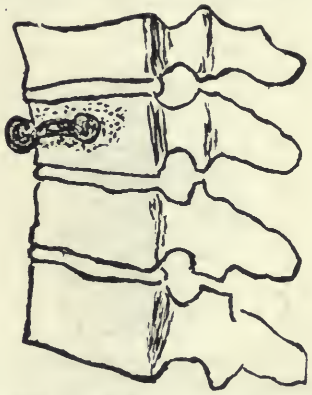

Fig. 1—Tuberculosis of the spine. Primary focus in the body. (After Calot).

Will any one please tell me, if there is an excuse for these poor cripples to have been allowed to reach these states of misery? We are confronted with the same problem as we are in appendicitis. Early diagnosis of the disease can be made if proper diagnostic methods are used, assisted by a careful history of the case. In every case of tuberculosis of the spine the patient or parent will tell us of an injury, that he had a fall three to six weeks before observing the first symptoms, that something was wrong. After the injury, the patient has no symptoms for a certain period, then he complains of pain in the back.

In grown persons this pain is usually called lumbago, which medical term to me is the same as the term "sciatica." In sciatica, which is really neuritis, there must be a cause. The cause may be intraspinal, or along the course of the sciatic nerve or in the nerve itself. Lumbago is usually to be properly termed spondylitis, but it may also be an affection of the sacro-iliac joint. Therefore every case which comes to us for backache should be analyzed very thoroughly.

In growing children with pain in the back, especially on movements of the spine, the mother will often recognize the sensibility of the child's back while bathing the child. The child will cry, when a certain spot on the spine is touched. Next there will develop rigidity of the spine. The child will assume an attitude of stiffness, trying to limit the motions of the spinal column as much as possible.

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*Read before the Williamson County Medical Association, April, 1919.

When those symptoms are present we may be certain that a destructive tuberculous process is already going on in the body of the vertebra. In tuberculosis of the spine, the initial pathological process always begins in the body and not in the transverse processes. What happens with the body of the affected vertebra? The same thing as happens to any joint in the body affected with tuberculosis. We must not forget that tuberculosis of the joint always primarily involves the epiphysis and the subsynovial membrane. That part of the bone which has the most intensive blood supply will be attacked by the tubercle bacillus. The pathological process beginning in the epiphysis will spread in the cancellated structure of the bone, the destroyed cancellated tissue will give way at the point of least resistance and therefore the consequence will be, that the synovia will become affected. The synovia from the irritation produced will throw out fluid, which will cause swelling of the joint. You may aspirate this fluid again and again vainly trying to find the tubercle bacillus in it. The bacteria are in the subsynovial space. If this pressure is not relieved by repeated aspiration, it will cause the destruction of the synovia and the tuberculous focus will break through, involving the joint and causing complete destruction. Then, and only then, will we be able to find tubercle bacilli in the aspirated synovial fluid.

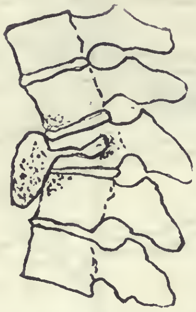
Fig. 2—Progressive disintegration and collapse of the vertebral body. (After Calot).

When the synovia is destroyed, the pathological process spreads to the surrounding loose connective tissue, causing cold abscesses. If the synovia is destroyed, then the joint is absolutely destroyed and ankylosis will be the outcome. Ankylosis will in many cases be the cure of the tuberculosis of the joint. We all know that the tendency to heal a tuberculous process is always towards resolution. Therefore absolute rest is the first principle to adopt for a cure of tuberculosis. In freely movable joints we always treat at first conservatively with immobilization. In tuberculosis of the lungs we similarly immobolize by producing an artificial pneumothorax by injecting nitrogen into the pleural cavity. This fundamental principle has been applied by Hibbs, and later modified by Albee, in curing Pott's disease.

I have been speaking of tuberculosis affecting a freely movable joint. Now in a slightly movable joint such as between the spinal vertebrae, what are the consequences of neglect? We know that tuberculosis belongs to the category of granulomata. The body of the vertebrae, which has more cancellated structure than the arches and transverse processes and a better capillary blood supply is affected. There is no synovia present. The process is limited to the body itself, causing a complete destruction of the osseous structure of the body (figures 1, 2, 3). Sequestration will take place in the body and nature will try to cure the disease by encapsulation. Therefore through the irritating activity of the cells an increased output of osteophytes will take place, which will break through the shell of the body of the vertebrae into the surrounding soft tissue, causing cold abscesses such as psoas abscesses, or it will break through the posterior shell of the vertebrae and encroach on the spinal cord, causing symptoms of compression (figures 4, 5, 6).

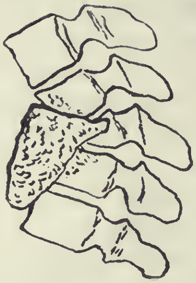
Fig. 3—Spread of infection to contiguous vertebrae. (After Calot).

These cold abscesses, as we call them, should never be incised, no matter where the tuberculous process is active, be it in the pleura, or in the region of a joint. If there is a psoas abscess, aspirate and inject chemicals which have a stimulating effect on the production of leucocytes; iodoform and formaline in glycerine are the two which have most been used. Mosetig-Moorhof of Vienna has used iodoform for many years before our great teacher, John

B. Murphy, began to use formaline in glycerine with splendid success.

Unfortunately most of the cases of tuberculosis of the spine come to us when the process has already so advanced that either kyphosis or lordosis has taken place. If the patient presents a picture of kyphosis we can make a positive statement that the beginning of the tuberculous process was in the fore part of the body of the vertebrae. In lordosis the hind part has been primarily affected. Both those deformities are produced by the superincumbent spine telescoping where resistance is least. Our attitude in those cases is to perform either a Hibbs or an Albee operation, that is, when lordosis or kyphosis has already taken place. Those operations should never be performed, if a cold abscess is present. The success of these operations depends upon asepsis. We all know that a transplant of bone will not heal, if infection of the wound takes place. Sometimes slight infection of the wound will not interfere with the healing of the transplant, but usually the results will be bad.

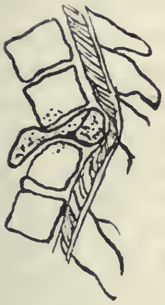
Fig. 4—The dislodgment of the disintegrated vertebrae and pressure upon the cord. (After Calot).

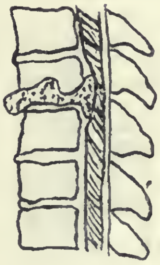
Fig. 5—The escape of an ichor pocket into the epidural space and compression of the cord between it and the neural arch. (After Calot).

If the tuberculous process is permitted to progress for some time, then in some cases the patient will present a typical picture of paresis. All such cases will show kyphosis or lordosis and therefore the differential diagnosis should not be difficult. The extent of the paralysis will depend entirely on the location of the tuberculous focus and on the extent of pressure exerted on the spinal cord. The prognosis in all these cases depends entirely on the amount of pressure exerted on the spinal cord and on the length of time this pressure was active. If the compression is in a direction there the cord will be unable to overcome its effect, then the result will be a permanent injury, instead of dealing with a suspension of the functions of the cord we have then to deal with degeneration.

We all know that the essential elements in a nerve fiber are the axis cylinder process, the medullary sheath and the neurilemma. The axis cylinder process function is to transmit nervous impulses. The medullary sheath is the insulating layer and the neurilemma is the regenerative structure. All peripheral nerves have a neurilemma and therefore will regenerate, but nerves of special sense and the nerve cells of the brain and spinal cord have no neurilemma. Therefore if compression has caused destruction of those nerve fibers, regeneration is out of the question. There is an exception in the nerve cells in the spinal cord and this is the cauda equina.

The first question is the diagnosis. This should not be difficult at all. The *x*-ray plates will show us very clearly, whether we have to deal with an inflammatory condition, or with tumor formation, such as sarcoma of the vertebrae, or if we have to deal with a fracture-dislocation. A kyphosis due to fracture-dislocation is never painful after the acute period has past, and the onset of symptoms of compression is not as gradual as in tuberculosis. Degeneration of the spinal neuron will take place much more rapidly and degeneration of muscle fibers will be the result, if the nerve supply to the muscle cell is cut off. Therefore in most of the cases of tuberculosis of the spine with pressure symptoms, atrophy of the muscles paralyzed has not taken place. And on this phenomenon depends the prognosis of the case. If atrophy of the muscle has taken place the prognosis is bad.

Another point worth while in differential diagnosis is, that the paresis, as we may call it, is always of a spastic nature. In spastic paralysis, there is an affection of the cord itself and not a lesion of the extra-cranial or extra-spinal nerve fibers. Paralysis of the peripheral nerves, *e. g.*, the brachial plexus, is never spastic, but flaccid.

The sensory disturbances are dependent entirely upon the extent of compression of the cord. Very often the epicritic reflexes; which refer to the skin, are not involved at all and the same is true of the protopathic reflexes.

Trophic disturbances are often met, depending upon the extent of compression of the cord. The anterior horns, with the motor cells, are naturally earlier affected than the posterior, which are concerned in sensation. What shall we do for such cases?

What is the operation of choice in preventing complete destruction of the spinal cord? Common sense will teach us that there is only one operation which will alleviate this condition and this is simple laminectomy or decompression of the cord. All we have to do is to relieve pressure on the cord and if only suspension of the functions has taken place, the patient will get well after the operation, provided other means of assistance are given. In the first place, do nothing more than a simple decompression, which in itself is a simple operation. In former years, when radical work was prevalent, Sir Victor Horsley used to decompress, then open into the granuloma and scoop it out. Today we do not need to undertake this step. The administration of tuberculin will take care of the granuloma and the patient will get well. Never drain these cases. If in the process of decompression we do open into the granuloma and the débris shows itself in the field, it should be carefully scooped out, the wound dried, mopped out with lysol or phenol solution, and dried again and sprinkled with powdered iodoform. Then close the wound by taking a strip of the erector spinal muscle and cover the cord with this flap.

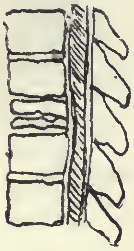

Fig. 6—Pachymeningitis caused by extension of infection from the subjacent osseous lesion. (After Calot)

Close the fascia and insert figure of eight sutures obliterating all dead spaces. Apply a plaster jacket and begin tuberculin treatment. The outcome will be gratifying to you and to the patient.

The question will come up whether removing the spinous process and part of the arches will interfere with the strength of the spinal column. It has been proven that the removal of the spinous process and the arches of the vertebrae will not materially affect the strength of the spinal column.

The administration of tuberculin in tuberculosis of the spinal column has given the most promising results and never should be neglected. The tuberculin in proper doses can be given by the family physician but he must not push its administration. If he does, he will have a complete failure. Tuberculin should never be given oftener than once a week and the fluctuation in the daily temperature should be a guide to the opsonic index.

The prognosis after this operation of decompression in tuberculosis of the spine is good, provided degeneration of the nerve fibers of the spinal cord has not taken place. After the operation of decompression the surgeon must not expect that the patient will be able to get out of bed and walk in a week. Improvement will be gradual and it may be many months before the patient will be able to walk. Therefore be very conservative in your prognosis as a matter of self-protection.

The following case, referred to me by Dr. Flinn of Hutto, Texas, presented a typical picture of negnected tuberculosis of the spine:

Miss A. D., age 14 years. Former history unimportant. Present history: Three years after a fall, seven years ago, there appeared a boil on the back and from that time curvature of the spine developed. Six weeks ago there began numbness in the lower limbs followed by loss of motion. There is sensation to touch and slight strength to extend the knees, but no active flexion is possible there. Spastic paralysis. Babinski phenomenon and increased ankle clonus present. Exaggerated patellar reflex. Cannot cross the legs. Cannot flex the thighs nor raise herself from lying position. Skiagram shows: marked kyphosis at level of 12th dorsal; destruction of body of 12th dorsal and partial destruction of bodies of 11th dorsal and 1st lumbar vertebrae.

Operation: Decompression of cord with flap closure from erector spinal muscle.

Outcome: Primary union. Tuberculine started 10 days after operation. Marked reaction. Improvement. In two months patient was able to walk without any help. Later lost track of case.

Corner Kimbro and 6th Streets.

Exophthalmic Goiter.

It cannot be denied that certain patients improve and apparently recover under medical treatment. However, in the beginning of the disease it is impossible to distinguish between the patients who may fall in this group and those who are destined to suffer severe damage as the disease progresses. Great responsibility is assumed, therefore, by advising medical treatment in early cases, in which thyroidectomy might prevent the severe conditions and in many instances the death of patients who would fail to improve under medical treatment.—W. E. Sistrunk in the *Journal of the A. M. A.*

OPEN TREATMENT OF FRACTURES.

Isaac A. Arnold, M.D.,
Louisville, Ky.

Great advance has been made in the treatment of fractures during the past ten or twelve years; especially is this true of the open method. Fifteen years ago the opening of a simple fracture was almost unknown, but today most surgeons have little hesitancy about performing open operation where function and apposition are faulty. Credit is due Mr. Lane for the progressive development in aseptic methods and perfect operative technique in bone surgery. Since Lane's initiative work much has been accomplished by such men as Geiger, Albee, Hibbs, Murphy, and others.

I would like to have it understood at the outset that I do not approve of indiscriminate operating on simple fractures where good apposition and function can be secured by the closed method. I desire it equally understood that any over-riding, displacement of fragments, shortening or malposition should be corrected by the open method if it cannot be accomplished otherwise.

We have learned much from the war just ended about the treatment of fractures, and the time has passed when good results and satisfactory function can be claimed with an over-riding fracture and shortening of one-half to one inch. There may apparently be a certain amount of function in the locality of the fracture, but we must consider the disability which arises from displaced bone, shortening or malposition, and the effect this feature may have on bloodvessels, nerves, or a joint, which may not have manifested itself at the time the patient is dismissed. He will probably later either consult you or an orthopedist because of varicose veins, constant pain in some nerve, or "strained" joint, which continually annoys him. Such lesions were formerly called neuritis, "rheumatism," etc., but with the advancement in bone surgery, and with the valuable aid of the *x*-ray, we are now oftentimes able to relieve obscure cases of "rheumatism," neuritis, etc., by locating and correcting bony malposition, which in former days would have been considered good apposition and function. I believe all fractures of the femur with imperfect anatomic apposition should be corrected by open operation.

On what class of fractures should we use the open method?

(1) Where there is considerable displacement of fragments that cannot be otherwise corrected:
(2) Where complete reduction cannot be secured by manipulation:
(3) Where manipulation causes undue trauma to other structures:
(4) Where there are spiculæ of loose bone or soft tissue between the fragments:
(5) Where the fragments are rotated upon each other and cannot be maintained in proper position:
(6) In spiral and multiple fractures:
(7) Where fractures involve either nerves or bloodvessels:
(8) In ununited fractures and in vicious union:
(9) In fractures complicated by dislocation and in close proximity to joints:
(10) In all fractures of the femur not in perfect anatomic apposition.

In all the lesions mentioned the results will be far better by open operation than by trying to reduce and maintain the fragments by manipulation and external fixation, provided the surgeon is experienced in bone work, has modern instruments for the purpose, and his surroundings are such that perfect asepsis can be secured.

The operative technique of intra-articular fractures is very difficult and should not be undertaken by one who has not had considerable experience in bone work. As Geiger (quoting Hitzrot) has well said, the most striking contraindications for operation on broken bones are inexperience on part of the surgeon, unsuitable surroundings, and insufficient equipment; furthermore, the operator to be successful must have a thorough knowledge of the anatomy of the region to be operated upon, and should understand the action and function of the muscles and ligaments involved in the injured member. Such knowledge may prevent some of the most noticeable failures in the treatment of broken bones.

Excellent results can often be secured by non-operative methods by a surgeon with mechanical skill and experience. The reduction of fractures should always be checked by the *x*-ray to determine whether or not the fragments are in perfect apposition, as that is the only positive way this feature can be determined. At the same time it should be borne in mind that the *x*-ray often seems to exaggerate the deformity if one is unfamiliar with the angle at which the picture was taken.

Why should we operate? First, the greater percentage of cases in which satisfactory function is secured is in favor of open operation considering all classes of fractures. In special fractures, such as both bones of the forearm and the femur, the open operation should always be performed if the position is faulty, furthermore, open operation is more favorable as age advances. Second, perfect anatomic apposition, hence better cosmetic results; and to be certain of good function, be sure of correct anatomic apposition. Third, union is earlier following the open method, that is where bone grafts are used, but prolonged when foreign material is employed.

When should we operate? In non-infected fractures operation should be performed with the least possible delay after receipt of the injury, *i.e.*, within five or six hours. This is the most favorable time for operation provided too much trauma has not been inflicted by attempted reduction by the closed method. Therefore, *x*-ray examination is absolutely essential to determine the type and position of the fracture, and the advisability of operation before the tissues have been traumatized. The best results by either operative or non-operative methods are secured where the least amount of trauma has been inflicted. If a patient with fracture is seen after twenty-four hours, and there is evidence of considerable damage to the surrounding soft parts produced either by the initial injury or attempted reduction, I would advise waiting ten or fifteen days, or until the tissues have resumed a more normal condition, before operating.

As to material to be used in bone grafting: I would employ only autogenous grafts and metal fixation. In non-infected cases where the anatomy of the part injured does not require too much strain at the site of fracture, the bone graft is preferable. Personally I prefer the inlay or sliding graft to the intermedullary where conditions will permit.

THE TECHNIQUE OF BONE GRAFTING.—It is scarcely necessary for me to emphasize the importance of strict asepsis, as that is one of the fundamental points in successful bone grafting. Certain mechanical and physiological principles must be followed regardless of what material may be used, whether the intermedullary, a transplant from the tibia, the rib, or a sliding graft. In making the incision keep constantly in mind the anatomy of the important structures. Proceed gently and accurately and with as little trauma as possible. After reaching the bone at the site of fracture, careful examination should be made with proper instruments (not the hands) to determine whether an inlay, a medullary or a sliding graft is most appropriate. If an inlay or sliding graft be used, cut the piece of bone or graft so it will fit snugly into the groove made to receive it. This bone should include periosteum, compact bone and endosteum, and should be placed in position so that intimate contact is secured between periosteum and periosteum, compact bone and compact bone, endosteum and endosteum, and be retained by autogenous bone pegs or kangaroo tendon to insure perfect apposition of the graft.

In cutting the graft I prefer a single saw. If a twin saw is used the graft will be the width between the saws, smaller than the groove to receive it, thereby improper apposition and imperfect union may be expected. Likewise it is important that the graft shall not fit too tightly, as pressure may produce necrosis of the bone cells and thus retard union.

Another important feature toward retaining the life of the graft is that the motor should be at such a rate of speed that the heat will not destroy the bone cells. It is inadvisable to have water flowing over the saw to cool it, as this washes away material that is desired should remain in contact with the bone.

If an intermedullary graft or dowel is used, all periosteum must be removed from that part which extends into the canal of the bone; if there is any space or loss of substance from the ends of the fragments, the periosteum should be left on the graft in that space. The dowel should be cut to fit snugly into the canal of the bone. All ivory-like bone should be removed from the canal so the dowel will come into contact with the healthy bone and marrow. Perfect hemostasis must be maintained in this method as well as in the inlay, as a blood clot may separate the soft structures from the bone and the graft will in consequence be poorly nourished.

If a rib or bone from any other part of the body be used, the same principles must be observed, bearing in mind the essential element of a transplant is the cortical bone because of its resistance to change, its small vascular supply, its power to live on a small amount of nourishment, and its active osteogenetic properties which cause it to grow with rapidity and firmness.

The principles just enumerated are the fundamentals in all bone grafting. However, variation in technique and material may be necessary in special fractures. For example, bone pegs are used in fractures of the anatomical neck of the humerus.

As to fixation: It must be borne in mind that bone grafts or pegs are for the purpose of promoting union and to maintain the fragments in direct apposition and continuity—not for strength. Therefore, it is essential that the part grafted be handled carefully and completely immobilized in a plaster of paris cast,—including one or more joints above and below the graft.

As to internal fixation by metal, such as wiring, nailing and plating: Plates should be used in preference to grafts in the presence of infection, where there is great strain on the bone at the site of fracture, and in some of the larger bones when time is important, as one can plate a bone much quicker than a graft can be inserted. In plating a simple, non-infected fracture, the technique is somewhat different from that of infected fractures. In a simple fracture one must use the same precautions as to asepsis as in grafting, and the same care as to handling of the tissues. Make a free incision to the periosteum, but do not disturb it; if from the injury the periosteum has been torn or stripped from the bone, it should be replaced. It is essential that no part of the lacerated periosteum be allowed to extend into the soft structures, as it has osteogenetic power at the osteo-periosteal angle when osteoblasts are attached; hence exuberant callus formation with traumatic exostosis may be expected as the logical result. This is serious when near a joint, as it will cause limited motion; it may involve important nerves and bloodvessels. I have seen this happen in several cases where the musculaspiral and sciatic nerves were implicated. The callus is also troublesome when deposited in the muscles, producing severe pain and limited motion until the callus is absorbed or removed. This is equally important in bone grafting as in plating.

Before the plate is applied see that the ends of the bone are free from foreign material, such as blood clot, bony spiculæ and soft tissue. Also curette the canal until healthy bone marrow is reached. Be conservative of bone, do not remove any part where there is no loss of substance, as jagged ends will become dovetailed and thus prevent shortening of the bone. Use a plate as long as the anatomy of the part will permit, leaving out the end screws nearest the line of fracture, as screws placed too close to the fracture will prolong and sometimes prevent union. The plate having been applied, all vessels having been ligated and oozing controlled, close the soft structures snugly by the layer method with absorbable sutures. Either alcohol or a dry dressing is then applied and the limb completely immobilized in a plaster of paris cast. Another point which must not be overlooked is: do not operate with a tourniquet applied, lest an overlooked vessel begin bleeding with resulting hematoma.

Wiring and nailing have a place in the treatment of special fractures, but their field is limited; therefore, I shall not dwell on that phase of the subject.

The plating of bones in the presence of infection unquestionably has a place in surgery, although the indiscriminate plating of infected fractures is justly condemned. After plating a badly infected recent fracture, with the circulation to the area greatly disturbed, not sufficient time having elapsed for collateral circulation to be established through the lacerated and bruised tissues, with vitality of the entire area markedly lowered, one need anticipate nothing more than failure.

When operating upon a compound, infected fracture, the original opening should be sufficiently enlarged to enable further work to be accomplished with ease. All scar tissue should be removed; this is not only the proper thing to do, but relieves tension and thereby makes the operative field more accessible. All sequestra and callus, also any fragments of bone of which there is any doubt about their viability, should be removed. All ivory looking bone must be removed from the ends of the fragments to be plated, leaving a bleeding area beyond the line of demarcation. The canal should be cleansed of all fibrous tissue until healthy bone marrow is reached.

In most instances the fragments will not fit closely enough to obstruct drainage; but if so a drainage opening should be made by use of the chisel. This is important, otherwise osteomyelitis is likely to develop. The plate should be applied in such manner that it will not interfere with coaptation of the soft structures and the bone at the point where first union is expected. Failure to do this will cause destruction of the bony fragments.

In selecting the plate one as long as the anatomy of the part will permit should be used—preferably a six screw plate—not inserting the two screws nearest the fracture line. Apparently this may seem a minor step, but I have seen cases where the bone became necrotic because screws were placed too near the fracture. Partially close the incision, covering as much of the bone as possible without obstructing drainage. Secure complete immobilization with a plaster of paris cast, a "spanner" being embedded in the cast to afford more strength in the region through which daily dressings are to be made. Another point to be remembered is that the large opening in the cast may permit the leg to herniate through this space, thus producing curvature at the site of fracture. This can easily be prevented by using one or two ordinary forearm splints over the space after the dressings are applied.

The plates should be removed as soon as the bones are sufficiently united to prevent displacement of the fragments. This can be done without an anesthetic and without removing the cast. As a rule within eight to ten weeks union will have become sufficiently solid to permit removing the cast.

In closing I wish to say there are many special fractures and injuries which require special technique. These are points I would like to discuss, but the paper would become too tiresome.

A FURTHER NOTE ON AN OPERATION FOR RADICAL CURE OF FEMORAL HERNIA.

Benjamin Brabson Cates, M.D.,
Knoxville, Tenn.

More than ten years ago I had occasion in an emergency (for strangulated femoral hernia with gangrene of the ilium in the sac) to cut through Poupart's ligament, in order to liberate the gangrenous bowel, and to secure ample working space for resection of the necrosed bowel. I closed up the opening in the peritoneum and sewed Poupart's ligament to the pubic portion of the fascia lata.

The result of this method of relieving the strangulation and performing the radical operation for cure of femoral hernia was so good that I felt justified in reporting it in *Surgery, Gynecology and Obstetrics,* October, 1909. The patient, a man, has remained well over ten years without recurrence.

Recently I have seen two other cases of strangulated femoral hernia, both in women (with hernia on right side) in whom the same technic, with slight modification was used.

One of these, a woman aged 21, I operated upon for Dr. W. A. Greer; in the case of the other woman, aged 40, I assisted Dr. H. J. Kelso. Both patients made uneventful recoveries, notwithstanding Dr. Kelso's patient had a profuse hemoptysis just as the operation was started, which upset the doctors and nurses very much. It looked as though the patient would drown in her own blood. Fortunately there was a throat aspirator at hand, which was set going and took out fully a pint of blood. Some aromatic spirits of ammonia was quickly poured into her throat, which stimulated respiration; the operation was then completed as planned. The patient made an uneventful recovery. It seemed strange the patient should have this hemorrhage, as she appeared to be perfectly healthy being, inclined to stoutness, and had never had a chronic cough. Her heart was sound and her lungs were clear. She has had no cough since the operation. In both these cases the sac was large and it was impossible to reduce the bowel until Poupart's ligament was divided.

The technic used in these two cases was the same as I used ten years ago except as to dealing with the sac, as described below: A long incision was made in the skin from the spine of the pubis outwards, below and paralled with Poupart's ligament. Two pairs of Mayo's forceps were thrust in the femoral ring above the neck of the sac for a short distance and the falciform and Poupart's ligaments divided for half an inch; then other forceps were pushed in above the first pair and the tissues divided, using scissors. By sponging back the tissues, and dividing between forceps, one avoids wounding important structures, and if anomalous obturator, or deep epigastric arteries are divided, they are held securely between the forceps, and can be tied at leisure, thus avoiding flooding the field of operation with blood, embarrassing the operator and prolonging the operation. After dividing the ligaments the sacs were opened and the bowels replaced.

After replacing the contents of the sac, the peritoneum was pushed back with gauze for an inch or more above Poupart's ligament. The sac bore the same relation to the general peritoneum as the neck of a gourd does to the body of a gourd. The narrowest part of the sac was then tied with a double strand of No. 2 catgut on a Mayo needle. The redundant part of the sac was then cut away; the remaining part of sac was gathered on the catgut suture and the needle thrust through the entire thickness of the abdominal walls and sewed to the anterior surface of the abdomen, as in the MacEwen operation for inguinal hernia.

This last step of the operation is entirely outside the peritoneal cavity. The operation is completed by sewing the inner end of Poupart's ligament to the pubic portion of the fascia lata with catgut and closing the skin incision with silk-worm-gut sutures without drainage.

508 W. Clinch Street.

The Incidence of Hernia.

Data on the physical examination of prospective employees reveal the fact that approximately 3 per cent. of the men offering their services to the industries have well developed inguinal hernias; approximately 14 per cent. have incipient hernias. Hernia occurs with sufficient frequency to be regarded as the greatest single frailty of the American worker. The oblique inguinal type comprises over 92 per cent. of all hernias encountered.—Charles A. Lauffer *in The Journal of Industrial Hygiene.*

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

NEW YORK, MARCH, 1920.

SURGERY IN EXOPHTHALMIC GOITER.

What are the results of surgery in exophthalmic goiter? How many cases are cured by operation, how many are distinctly improved?

The symptoms of exophthalmic goiter are attributed to hyperthyroidism, to an abnormal activity of the thyroid gland; and so, after practicing and discarding sympathectomy and other futile operations, there developed the procedure of removing more or less of the offending gland as a means of reducing its secretion. If the disease lies wholly within the thyroid, and its symptoms are wholly those of hypersecretion, removal of this organ would seem to be, on its face, a rational procedure. But are the premises sound? Is Basedow's disease an affection of the thyroid alone? Is hyperthyroidism an all-inclusive description of its phenomena? Finally, do the results of thyroidectomy or of polar ligation support the argument?

How much do we know of the pathogenesis of exophthalmic goiter? How much are we yet to learn of the perverted physiology with which it is associated or which it produces? To what extent are the organic and functional disturbances of other organs due to the involvement of the thyroid, to what extent are they the expressions of a disease of which, perhaps, this gland only furnishes the most striking phenomena?

Instances are many of the rapid development of Basedow's disease after other illnesses, more or less severe, and after nervous shocks. Indeed, it seems not unlikely that the nervous system plays a large rôle in the etiology as well as the sympomatology of exophthalmic goiter. Nor is it rare that all the signs and symptoms of a severe Basedow's disease disappear during treatment by rest and environmental change or, indeed, without any rational treatment.

Surgical literature is replete with contributions concerning the technic of operations for exophthalmic goiter; concerning the ultimate results of operation one finds very little. On the programme of the forthcoming meeting of the American Medical Association are four papers on thyroid surgery—all, apparently, dealing only with the technic, not the ultimate results.

Surgeons are quite familiar with cases in which thyroidectomy has failed to improve exophthalmic goiter and others in which the improvement has been little or transitory; and, too, we know that alarming, often fatal exaggeration of hyperthyroidism sometimes follows immediately upon surgical manipulation of the gland. It is indeed an accomplishment that Crile has been able to obviate or to overcome this by the methods he has evolved. In his address before the Clinical Congress of the American College of Surgeons last October (published in *Surgery, Gynecology and Obstetrics,* January, 1920) he reported that as a result of the system of management he then described he had reduced his mortality from thyroidectomies in exophthalmic goiter to 1.1 per cent.—a series of 182 with but two deaths. But concerning the ultimate results Crile says nothing beyond a passing reference to "striking benefits."

Is it not time that we took stock of these end-results?* Many surgeons are having misgivings concerning the value of surgery in Basedow's disease—perhaps unjustifiably, perhaps because of faulty methods of management or after-treatment, perhaps because of insufficient experience. They want to know whether or not we are on the right track! The internists, too, are in doubt. Some are quite dissatisfied with the results of surgery in Basedow's disease. In the October-December, 1919, issue of *Endocrinology,* Israel Bram, of Philadelphia, says:

"Exophthalmic goiter does not fall into the realm

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*Seven years ago C. H. Mayo, reporting 2,295 operations for exophthalmic goiter, said "Operation in cases of hyperthroidism appears to give about 75% of cures, while the remaining 25% are more or less benefited, according to the degree of complication and the stage of the disease. Probably 10% have some degree of relapse in from one to three years after operation."—(*Journal of the A. M. A.,* July 5, 1913.)

of surgery," except . . . . "the secondary or Basedowified goiter, whether causing mechanical symptoms or not. . . . In this latter type the thyrotoxicosis is secondary to the presence of that goiter, be it colloid, cystic, or otherwise, and as soon as the goiter is removed, the toxic symptoms disappear. These cases present the most gratifying surgical results. These conditions, however, are not the true, clear-cut cases of Graves' disease, a condition in which we unreservedly deny the right of surgery to interfere. . . . . .

Statistics are a great source of error in surgery as elsewhere. The gloating over low mortality figures is a very misleading point to far-sighted investigators. . . . Mere improvement is not sufficient reward to the patient for the risk that she has consented to undergo, nor is it sufficient compensation for the scar which she will present throughout life. Improvement is usually short-lived in almost every instance, the status merging back to the full-fledged condition with which the patient formerly suffered. Indeed, occasionally the symptoms will return with greater vehemence than the occurrence of the original attack. . . . .

In the rare instances in which there is no recurrence of the symptoms within a year or two following thyroidectomy, the patient had obtained either (a) a natural cure, i. e., the patient was one of those rare instances which tended toward spontaneous recovery, treatment or no treatment; a case of this sort gets well not because of but in spite of surgical treatment; or (b) a non-surgical cure. Careful surgeons will see that their patients be given prolonged non-surgical treatment prior to operation, and many still more carefully outline non-surgical treatment for a long time after operation is performed, ... the credit of the possible relief or cure of necessity reverting to the non-surgical procedures employed before and after the operation, ... without the religious observance of which, it is frankly admitted by the surgeons, the patient has little hope of the relief of symptoms.

. . . .

The real difficulty in the treatment of hyperthyroidism has been that both surgeons and internists have looked for immediate results and drawn their deductions and statistics accordingly. . . . . . The truth of the matter is that the surgeon should show less haste, and the internist more patience, in the treatment of these cases. I base this conclusion upon the lack of statistics proving permanent cures in exophthalmic goiter on the part of surgeons, and upon the presence of a large number of permanent cures effected by some internists who skillfully and patiently employ the proper non-surgical procedures through the length of time necessary to bring about complete recovery."

Surgical statistics afford no basis for disputing Bram's contentions. We question, however, whether most internists will agree in his concluding statements:

> "Careful non-surgical management, then, is capable of completely and permanently curing the great majority of cases of hyperthyroidism. The occasional exception not responding to non-surgical measures is not an instance of genuine Graves' disease, but is one of malignant degeneration of the thyroid gland, a case of toxic symptoms superimposed upon a long-standing non-toxic goiter, or a case brought to the clinician's attention in a moribund condition. The writer, in unison with others interested in thyroid therapy, does not hesitate to conclude that he has been able to cure every case of primary Graves' disease in which a fair degree of co-operation was obtainable; this was accomplished in from six months to two years, depending upon the exigencies of the case treated."

If internists generally, or any considerable number of them, could "cure every case of primary Graves' disease in which a fair degree of co-operation was obtainable" they would not have turned to the surgeons for help. The non-surgical treatment is sometimes a distinct failure; and, too, a very large percentage of the cases of exophthalmic goiter is among those who, with the best of intentions, cannot supply the necessary "degree of co-operation," nor submit to the prolonged abstention from household or other work that the treatment often requires.

The fact is that we know too little concerning the processes of the disease to say how it should be treated. Spontaneous recoveries take place "in spite of" medical as well as of surgical treatment. Careful non-surgical management is unquestionably responsible for some cures. Perhaps surgery has a valuable place in the therapy of exophthalmic goiter; perhaps it has none. Let us know the facts from an analysis of end-results and thus clear the way for its further development or for its abandonment in favor of some more rational plan.

AMERICAN MEDICAL EDITORS' ASSOCIATION.

The fifty-first annual meeting of the American Medical Editors' Association will be held at the Grunewald Hotel, New Orleans, La., on Monday and Tuesday, April 26th and 27th (during the week of the A. M. A. Convention), under the Presidency of Dr. Seale Harris, editor of the *Southern Medical Journal.*

ANNOUNCEMENT.

The May issue of The Journal will be devoted to the surgery of the nose, throat and ear.

Surgical Suggestions

The severe pain of a fresh burn may be relieved by immersing the part in cold water.

The healing of a sluggish wound may sometimes be much accelerated by exposure to sunlight.

Unless the cause of a post-operative rise in temperature is otherwise obvious examine the wound!

The operation of subtemporal decompression will fail of its object if the surgeon removes too small an area of bone.

When amputating an infected finger or toe tie a catgut ligature about the flexor and extensor tendons, including their sheaths, proximal to the level where they are to be divided. This is to prevent infection spreading up in the sheaths.

In children, especially, attacks of acidosis may resemble those of acute appendicitis. Malaria sometimes causes abdominal symptoms that may be mistaken for those of appendicitis or cholelithiasis.

"Chronic appendicitis" without definite attacks is often not appendicitis at all; and a large percentage of people operated upon for "chronic appendicitis" have not been relieved of their pains.

There are two operations in which it is permissible and desirable to use an ungloved hand: in the suprapubic enucleation of the prostate and in the search for a small foreign body—especially a needle fragment—in the muscles.

After thoracotomy for empyema Carrel-Dakin treatment of the cavity breaks up any contained fibrin clots and, if properly carried out, it usually effects early sterilization and healing without the necessity for any secondary operation. Rib resection in thoracotomy for acute empyema is not necessary.

Pneumothorax and collapse of the lung will result if the chest is opened too early, for the evacuation of a developing empyema thoracis. Do not operate until the fluid has become frankly purulent, by which time the collection will be walled off by lung adhesion. Meanwhile care for the patient's general condition and, if necessary, draw off embarrassing fluid by aspiration.

Surgical Sociology

Ira S. Wile, M.D., Department Editor

INDUSTRIAL HYGIENISTS.

Among recent developments in medicine the growth of industrial hygiene stands out with peculiar prominence. For many years the contract employment of physicians to attend injured employees has been recognized as an unsatisfactory method of meeting the surgical problems in industry. All too frequently work of this character was seized upon as a sort of temporary stop-gap to meet the overhead expenses of young physicians with ample time and, unfortunately, inadequate experience.

In large plants the growth and development of first aid facilities under legal mandates gave rise to the improvement of emergency aid; and a gain and benefit was effected through the establishment of operating rooms for minor surgery, and in very large plants, or those with great hazards, through the institution of industrial hospitals on an individual or cooperative basis.

With the spread of Workmen's Compensation legislation and a growth of interest in the "safety first" movement, expansion of industrial surgery followed the lines of prevention, the inauguration of a system of industrial nursing and an increase in plans for more adequate surgical service including dispensary and hospital provisions. Recent developments in the improvement of medical departments in industry have given rise to a broader idea of the value of medical service in industry and have led to the evolution of specialized experts in industrial medicine whose field demands full time service and can be filled only by medical men of considerable experience in general practice, supplemented by a reasonable degree of knowledge of preventive medicine, mental hygiene, the prevention of accidents, and surgical technic.

The qualifications for industrial physicians, however, demand a variety of experience that will enable the medical director to cooperate with public health officials on the one hand, and to serve with equal expertness the employers and the employees in the specific industry over which he presides in a variety of directions. As pointed out by C. E. Ford, in the *Journal of Industrial Hygiene*, December, 1919, the industrial physician must possess some practical working knowledge of the special problems involved in the employment of men, women and children. He must be familiar with systems of pension and insurance, including liability, group, and social insurance. There must be more than a theoretic acquaintanceship with job analysis, including physical and mental tests necessary to determine the fitness of the applicants. On the educational side, it is essential that he know something concerning industrial training, continuation schools, the possibilities of specific educational development without the industry or in some institution provided at private or public expense.

The relations of accident and disease to hours of labor, monotony of occupation, and speed are sufficiently important to demand an understanding of various phases of industrial application to personal health. This includes, also, a wide grasp of the physical working conditions in the individual plant with general knowledge concerning the hygienic values involved in heating, lighting, ventilation, the value of wash-rooms, restaurants, and rest rooms, water supply, toilet and similar practical factors that determine the healthfulness of industrial environment.

Obviously, a medical director is responsible for the physical examination of employees and the periodic re-examination of employees as well as the personal oversight of those injured or diseased through occupational dangers. This embraces also familiarity with follow-up systems, physical and industrial rehabilitation, including the replacement of the injured and crippled employees, as well as the transfer and replacement of industrial misfits and the adjustment of jobs to the physical and mental potentials of those accepted for service.

To these general capabilities there must be added an ability to mix well with men, to be able to give counsel concerning athletics, social and educational activities, facility in expression and an understanding of the human equations that are to be solved in connection with the industrial difficulties that are wont to arise at the present time. This necessarily includes an ability to grapple with numerous social, economic, educational and industrial difficulties that are as important in industry as operations following accidents, or as the construction, management and supervision of a corporate hospital. The complexity of questions that deal with labor turn-over, wage adjustments, company housing, labor-saving devices, minimum wage disputes, unionization, or the effects of varying costs of living are not foreign topics in the mind of the industrial physician.

It is patent from this brief survey of the requirements of industrial medical directors that the poorly trained, inexperienced, part-time service physician or surgeon is completely unqualified to meet the demands now being made by industry. It, therefore, is not strange that a new field should be opening up that offers large rewards, financial and ethical, for those competent to serve the industry and the community of which it forms a part. Within a comparatively few years many large industries have placed their medical affairs upon a high plane of ideals of service, and growth in this direction is rapidly increasing. This represents another step in the development of the idea that the maintenance of the health, welfare, and happiness of employees is an industrial asset as well as an industrial responsibility. Through the establishment of industrial hygienists as medical directors the public health movement is receiving a new impetus and communal health is achieving a rich benefit.

Progress in Surgery

A Résumé of Recent Literature.

Edward Bleier, M.D., Abstract Editor.

The Treatment of Bone Cavities. Walton Martin, New York. *Annals of Surgery,* January, 1920.

From a study of a large series of cases and long clinical experience, Martin draws the following conclusions in reference to bone cavities:

1. That complete removal of all the infected bone lining the cavity, of all foreign particles, and of every particle of dead bone is essential.
2. That in the great majority of cases, the cavity must be obliterated to insure healing.
3. That this is most satisfactorily accomplished by the removal of sufficient portions of the wall of the cavity to allow the soft parts to fall in and fill it up.
4. That in certain tunnels and cavities near joints some form of plugging may be indicated.
5. That of the many materials used as plugs, the free fat transplants present real advantages.
6. That the two-stage operation, with careful sterilization of the cavity under bacteriological control, following the Carrel-Dakin technic is of great value.
7. That in the small chronic abscesses in the ends of long bonds, with attenuated infection, no filling or intermediate sterilization is necessary.

Pathology and Treatment of Chronic Osteomyelitis in Unhealed War Wounds. Robert Goodman, Philadelphia. *Therapeutic Gazette,* February, 1920.

The author discusses the pathology of the commoner types of osteomyelitis following gun-shot injuries. In reference to treatment he lays down the following principles:

Do not use gauze drains; they do not drain, but keep up the discharge. It must be remembered that the sinus is not the primary lesion. Sunlight or heliotherapy is beneficial in tuberculosis, but not of any value in osteomyelitis. The only treatment of osteomyelitis is operative, at the proper time. Remove the superficial sequestrum and the cure is rapid if the cavity is small. Deep sequestra make the operation more difficult, with the presence of large cavities; but other methods are useless. The cavity must be obliterated. Spoon curettage of the sinus and cavity is useless; and radical excision is indicated especially in suppurating cavities. The healthy bone which forms the wall of the cavity fills up with a blood-clot, becomes fibrous, then cartilaginous, and then lime salts are deposited. The periosteum sinks into the cavity, and the depression always remains; the periosteum and endosteum forming new bone.

Filling of the cavity with sponges, decalcified bone and iodoform pastes have been used, but not very successfully. A wide removal of bone, allowing the neighboring soft tissues to come into contact with the remaining bone, is advocated. The cavity and sinus decrease in size gradually. Subsequent scraping is often necessary, because of secondary necrosis.

In cases of absence of a section of bone, regular flushing by the Carrel-Dakin method, until the infection and necrosed bone is eliminated, with subsequent bone transplantation, is successfully used.

Do not remove a joint if it can be avoided; an ankylosed joint is better than a flail one.

Studies in Bone Growth. Fred H. Albee and Harold F. Morrison, New York. *Annals of Surgery;* January, 1920.

The experiments were performed upon rabbits, with a view to discovering a reliable stimulant to bone growth. The following conclusions were drawn:

1. Cases of fracture, with loss of substance, showed a much more rapid bone growth, when triple calcium phosphate was injected into the gap between the bone ends, than did the controls without its use.
2. Callus formation in the cases of fracture treated with triple calcium phosphate, extended far into the soft parts, apparently following the penetration of the solution. In some cases the callus even extended out beneath the skin.
3. In the entire series of experiments, the average length of time for union in cases of fracture treated with triple calcium phosphate was thirty-one days. The average length of time for union in the controls, was forty-two days.
4. No appreciable bone growth was stimulated by an attempt to inject triple calcium phosphate beneath the periosteum of the radius, when the bone was not fractured. Undoubtedly the solution in such cases infiltrated the soft parts and did not actually come into contact with the bone-growing tissues.

It is evident that osteogenesis was stimulated by triple calcium phosphate in conjunction with fracture, or in other words, with trauma of sufficiently great severity to open up those bone surfaces containing active bone growing cells, namely the periosteum, compact bone, endosteum and marrow, thereby allowing the intimate contact of the solution with these layers.

5. Triple calcium phosphate produce no x-ray shadow by itself.
6. No toxic symptoms were noted in any of the cases treated with triple calcium phosphate. At no time did this agent act as an irritant locally.
7. In the animals treated, only one injection of triple calcium phosphate was administered. The suggestion is offered that the stimulating action of this agent might be increased by repeated injections at frequent intervals, in unfavorable clinical cases of pseudarthrosis, whether or not preceded by a bone graft operation.
8. It is believed that these facts are of sufficient value to warrant their clinical application, and the treatment is now being tried on human subjects.

Gunshot Fracture of the Femur. Sir Anthony Bowlby, England. *The British Medical Journal,* January 3, 1920.

Bowlby discusses in detail the management of fractures of the femur at the front, en route and the base hospital. His principals of treatment are outlined in the following paragraphs:

1. The first general principle which was universally adopted was that the apparatus employed should be a skeleton metal splint, and that this should be used so as to enable traction to be applied either directly downwards or else in various degrees of abduction or flexion. This was the essential foundation upon which all else was based.
2. The direction of the traction and the amount of flexion or abduction required were guided throughout by frequent radiograms. These were always taken by a movable x-ray apparatus brought to the side of the bed, and by the aid of these the position of the fragments was altered, so as to obtain accurate apposition. Without the frequent use at the bedside of x-rays it is not possible to obtain uniformly good results.
3. The length of the limb was at first measured daily and afterwards less frequently, and it was found most useful to keep a "chart of shortening" (or lengthening) over the patient's bed. It became the custom to apply extension until the injured limb was definitely longer than its fellow, as it was found that this gave the best end results. It is most important to bear in mind that even when the main fragments of bone are separated by an interval of as much as one or two inches the gap can be completely filled by new bone.
4. "Fixed" extension proved to be not so good as "continuous" extension. The traction can be employed either by fixing the foot, and then lifting the end of the bed and letting the weight of the patient act as the extending agent, or else by applying weight traction. On the whole, the use of the patient's own body weight was the method most in favor.
5. Movements of the knee-joint were begun early, and slight flexion of the knee was always preferred to traction on the fully extended limb. The early experience of the war had shown us that unless special precautions were taken a permanently partially stiff knee-joint was extremely common. This might be due to (*a*) mild sepsis; (*b*) fracture near the articulation; (*c*) scarring, shrinkage, and adhesion of muscles, tendons, and skin. Captain Watkin Williams devised a very simple metal apparatus, which was attached to the main splint, and enabled the knee to be freely moved or fixed at any angle of flexion. Colonel Besley, of the Chicago unit, gave great help by the callipers which he devised. These were fixed above the condyles of the femur, and were especially valuable for cases of fracture of the lower third of the femur, for their use completely overcame the flexion so common in these cases, and they also enabled the knee joint to be freely moved without disturbing the traction on the femur. Many surgeons employed "calliper extension" for all their cases. It should be noted that if callipers are employed the following precautions are necessary: (*a*) rigorous asepsis; (*b*) avoidance of the synovial membrane; (*c*) avoidance of the thin articular bone of the condyles by fixing the callipers on the denser bone at the level of the adductor tubercle; (*d*) the use of any simple method for preventing the too deep penetration of the bone by the points of the callipers.
6. For fractures about the upper third and the neck the patient was placed either upon the hammock-like swing cradle invented and described by Major Sinclair, or else upon the special segmented mattress designed by Major Pearson. This latter was adopted late in 1918 by the Army Medical Department for the treatment of all cases of fracture of the femur under treatment in England, and has been fully figured and described by Major Pearson in his book *Fractured Femurs* (Pearson and Drummond, 1919).
7. When union was sufficiently advanced it was the custom to get patients out of bed while maintaining the length of the limb by the application of "walking calliper splints" fixed to the heel of the boot. If these were employed the use of the limb accelerated the formation of callus, but if they were not provided many limbs yielded and became bowed in attempts to walk.
8. The treatment of the wounds was on general principles, but in the year 1918 very great benefit resulted from early "delayed primary suture" or from "secondary suture." Cases so treated showed a more rapid union of the fracture and a great shortening of the period of pyrexia. They also were much less liable to late necrosis of fragments and to secondary abscess. The natural result was a decreased mortality in sutured cases as compared to those unsutured and a great diminution in the amputation rate. In cases which could not be sutured the period of suppuration was often shortened by the employment of Carrel's methods.
9. The question of the removal of bone was not entirely settled when the war ended. There was no doubt of the advisability of removing badly smashed fragments which had been completely separated. But, while most surgeons did not advocate the removal of more than this, some operators followed the advice of Leriche and prac-

ticed subperiosteal removal of many of the partially detached fragments also. There seems no doubt that, on the one hand, the removal of all fragments which might necrose hastens the healing of the wound, whilst, on the other hand, this removal delays the union of the fracture, and, in the opinion of some very competent observers, has been responsible for permanent non-union in not a few instances.

The Anatomy of Snapping Hip. F. Wood Jones, London. *The Journal of Orthopedic Surgery,* January, 1920.

By operation on two cases in the military service Jones was able to determine the cause of so-called "snapping hip." The symptom is usually elicited on rotation from the extreme internal position to the position of extreme external rotation. Roentgenography and examination under anesthesia revealed nothing. On the operating table it was impossible by manipulation of the leg to reproduce the snap made during life, nor was any structure capable of causing the condition obvious from examination. The gluteus maximus was, therefore, electrically stimulated and while it was in a state of active contraction the leg was again manipulated. The snap was now elicited every time the great trochanter was rotated backwards or forwards between the gluteus maximus. Upon dividing the fascial insertion of the muscle and reflecting it towards the middle line it was at once apparent that the structure which infringed on the trochanter and caused the snap was the tendon developed on the deep surface of the muscle. This tendon constitutes the insertion of the gluteus maximus to the gluteal ridge of the femur and it was apparent that in these two cases the tendon was in an abnormal state of development.

Dissections on the cadaver show that many cases, with well developed gluteus maximus tendon, might have the latent power to produce the "snapping hip" symptom.

Modern Treatment of the Weak Foot. A. Whitman, New York. *Journal of the American Medical Association,* January 17, 1920.

In his army experience, Whitman found that when he first joined the British forces the British liaison officers discouraged the use of mechanical appliances, and when he came into the American Forces later, he found this view adopted by the orthopedic physicians, but they had gone one better than the British, in establishing a camp or battalion for soldiers rejected for active duty on account of weak feet, backs, etc. "There the feet were treated by raising the inner borders of the patient's heels and soles, and occasionally by applying a leather strap about the foot and ankle. Metatarsalgia was treated by a leather bar nailed across the sole behind the heads of the metartarsals. By carefully graded exercises alternated with periods of rest, and by constant supervision and rigid discipline, a very large proportion of these soldiers were returned to combat duty, one of Colonel Goldthwaite's greatest triumphs." The discovery that apparatus was unpractical for soldiers led to the next question as to whether the soldiers were willing to be cured. This was found to be the case with the majority. In civil life, however, at least half the hospital patients with weak feet are women, middle-aged, hardworking housekeepers, suffering also more or less from varicose veins. The men are much of the same class, and there are comparatively no young men or girls, and almost no children, voluntarily seeking treatment for this condition. Of late, however, there have been an increasing number of children brought to the hospitals on account of the ugly appearance of the feet or peculiar gait. Here the problem is quite different from that of military practice, and the main obstacle to successful treatment is the indifference of both patient and physician. Whitman finds in his hospital practice practically no patients who have not previously sought relief and obtained it only temporarily by varied nondescript apparatus which only relieve symptoms without removing the cause. Except in rare cases of congenital flatfoot and accidental deformity, the underlying cause of weak foot is the attitude of eversion of the foot commonly due to the practice of standing and walking with the toes turned out, causing the bodyweight transmitted downward to fall to the inner side of the foot. "This attitude being established, it is only a question of time for the astragalus to begin rolling downward and forward off the os calcis, thereby pressing on the ligaments, causing pain, and ultimately deformity. The mechanism of this process is simplicity itself, and may be demonstrated by dropping a plumb line from the patella, noting where the weight falls when the feet are in the different attitudes." Once this fact is established, it remains only to correct the bad habit, and here we encounter two difficulties—the private patient in civil life is not enough interested in his feet to devote to them the needed amount of thought, and the hospital patient who has to be cured lacks strength in his muscles to maintain the proper attitude continuously. The only apparatus, so far devised, which at once supports and attempts to correct the predisposing habit is that of R. Whitman. It not only "supports the arch" but also provides the lateral pressure needed. If a patient wearing a brace, tries to turn his toes out he becomes uncomfortable and in pulling away from the pressure of the brace he assumes the overcorrected attitude which is intended to become habitual. The patient gives his feet too little consideration. If he is willing to submit to an operation, the prolonged rest in plaster of Paris enables the relaxed ligaments and muscles to contract in the over-corrected position, and the operative scar later is a reminder to follow the surgeon's advice as to gait and posture. Whitman does not claim that this treatment will always be successful, but he gives detailed directions as to the method of fitting the plaster-of-Paris cast. To the average patient, it should be made perfectly clear that his true recovery depends on himself, following out the proper directions. There are three ways, Whitman says, in which the average weak foot can be cured: "(*a*) By proper shoes, plus a rigid supervision of the patient's daily exercise, gait and posture; (*b*) by prolonged rest in plaster-of-Paris with the foot in the over-corrected attitude, plus or minus operative procedure, followed by exercises, etc. (*c*) By the application of a proper brace, combined with daily exercises, etc." He believes that the late experience of the war has aroused physicians to the possibilities of correcting and to an interest in caring for these defects. If we have compulsory military training it will help with the rising generation.

The Surgical Treatment of Exophthalmic Goiter. George W. Crile, Cleveland. *Surgery, Gynecology and Obstetrics,* January, 1920.

The principal factors in Crile's system of management are outlined:

1. The differential diagnosis is greatly aided by the Goetsch test and metabolism determinations.
2. The operative procedures are graded according to the severity of the disease.
3. The inhalation anesthesia is nitrous oxid-oxygen, which is administered with the patient in bed; the operation being performed either with the patient on bed or after his transportation, under anesthesia to the operating room.
4. In moderate cases the entire operation may be completed at one séance.
5. In more severe cases the thyroid activity is diminished by a preliminary ligation, with the patient in bed, under nitrous oxid-oxygen analgesia and local anesthesia.
6. In extremely grave cases it may be necessary to diminish the thyroid activity by multiple steps: ligation of one vessel; ligation of the second vessel; partial lobectomy; complete lobectomy—allowing intervals of a month or more between these stages, the length of each interval being determined by the degree of physiologic adjustment.
7. If during the operation, the pulse runs up beyond the safety point, the operation is halted, the wound dressed with flavine, and the operation completed after a day or two when conditions have again become safe. In some cases even though the thyroid has been resected, it is advisable to dress the unsutured wound with flavine and make a delayed suture in bed the following day under analgesia.
8. In certain cases lobectomy is performed while the

patient is in bed under nitrous oxid analgesia and local anesthesia.

9. Psychic control of the patient, on the part of the surgeon, the interne, the anesthetist, and the nurse, is required throughout to diminish the intense drive. An anociated régime should be prescribed for the pre-operative, inter-operative and post-operative periods. The preoperative and post-operative managements are of almost equal importance to that of the operation itself.
10. If after the operation, the temperature becomes excessively high, with greatly increased pulse and respiration rates, the patient is packed promptly in ice.
11. To avoid the effects of too sudden a withdrawal of thyroid secretion, thyroid extract is given the night before a lobectomy.

Empyema. With Particular Reference to its Pathogenesis and Treatment. ALEXIS VICTOR MOSCHCOWITZ, New York. *Surgery, Gynecology and Obstetrics,* January, 1920.

From a very wide army experience as a member of the Empyema Commission, Moschcowitz presents a scholarly paper on empyemathoracis. His conclusions are as follows:

1. Empyema, in most instances, results from the rupture of a small, subpleural, pulmonary abscess.
2. An empyema is the final stage of a process, on which the first stage is a serous pleurisy, and the second a seropurulent pleurisy. The latter is the so-called formative stage of an empyema.
3. The formative stage of an empyema is unaccompanied by recent pleural adhesions. The stage of acute empyema is always accompanied by adhesions.
4. The vast majority of empyemata is of the encapsulated variety. Very few occupy the entire pleural space.
5. The treatment of empyema should be begun in the formative stage before the exudate has been converted into frank pus.
6. It is unwise to perform an operation in the formative stage. The mortality is terrific, because the accompanying pneumonia is still in full bloom, and furthermore, because of the absence of adhesions there occurs an acute pneumo-thorax, with fluttering of the mediastinum, and consequent embarrassment of the action of the heart.
7. The best surgical procedure in the formative stage is repeated aspiration, done as often as indicated in order to relieve the embarrassment due to pressure of the rapidly accumulating fluid. In a few cases this measure is even curative.
8. Feeding with a diet rich in calories, is an important adjuvant in the treatment of the formative stage.
9. The treatment in the acute stage of empyema consists in simple intercostal thoracotomy. This operation need not be considered an urgent one and should be performed when the patient's condition is otherwise perfectly satisfactory. This is the so-called late operation.
10. Urgent thoracotomy is indicated only in acute pyopneumo-thorax.
11. The Carrel-Dakin treatment has proved of superlative value in the post-operative treatment of empyema and should be instituted in every case. There are no contra-indications to its use.
12. The mortality of acute empyema by these methods is lower than reported by other methods of treatment.
13. Empyema cavities heal by three methods.
    a. By the formation and absorption of a sterile exudate.
    b. By the formation and absorption of a closed pneumo-thorax.
    c. By the classical method, *i. e.,* expansion of the lung and obliteration of the cavity.
14. Chronic empyema should not occur, or should at least become very rare, if the methods of treatment of acute empyema, as formulated above, are practiced.
15. Chronic cases may therefore be defined as empyemata, which are not amenable to Carrel-Dakin treatment.
16. Recurrences in empyema are usually the result of undue haste in closing the thoracotomy opening. The percentage of recurrences after the Carrel-Dakin method of treatment is less than after any other.
17. The vast majority of operations that have been devised for chronic empyema will have a very limited field of usefulness, if the methods of treatment above advocated are carried out.

The Surgical Treatment of Empyema by a Closed Method. ARVINE E. MOZINGO, Indianapolis. *The Journal of the Indiana State Medical Association,* February, 1920.

When fluid is suspected in the pleural cavity a diagnostic puncture should be made and if fluid is removed in which organisms are present, the operation should be performed immediately.

Under a local anesthetic a trocar cannula should be introduced (into the eighth space post axillary, preferably, if fluid has been found here).

The trocar is removed and a 4 mm. seamless tube introduced into the cavity through the cannula, which is now removed.

The fluid may be removed by connecting the tube to a Potain aspirator or it may be removed by a one-half ounce bulb syringe. The cavity is then cleansed with Dakin's or normal saline solution, depending on the condition of the patient. The tube should extend from 8 to 15 cm. inside the cavity and have fenestrae 2 mm. in diameter every 2 cm. so as to completely empty the cavity. The tube should extend outside the chest about 15 cm. The end of the tube should be capped with a rubber from a medicine dropper to decrease chances for contamination, and held on by a serrefine to maintain negative pressure. Tissue forceps and not the finger should be used in handling the tube.

The negative pressure established by the bulb syringe is sufficient to give maximum expansion to the lung and soon obliterates the cavity. The bulb syringe should always be used in preference to the glass syringe.

If the patient has an active pneumonia with high temperature, saline solution should be used for the first few days every four to six hours. Treatments are given usually every two hours by day and three hours by night. Once daily the cavity should be filled to about one-half the original capacity to prevent pockets from forming. As the condition improves, the Dakin's solution may be substituted for the saline.

The dressing is small and does not hinder free expansion of the chest. A No. 0 safety pin is thrust through the edge of the tube. Two pads 2.5 cm. square are placed one above and one below the pin. A 5 cm. pad is now threaded on the tube and held in place by four adhesive strips, each 5 by 8 cm.

After from two to fourteen days' treatment with Dakin's solution, 2 per cent. formaldehyd in glycerin in injected into the cavity once daily following treatment with Dakin's solution. This treatment is usually continued from three to ten days.

Smears and cultures should be taken only after vigorous agitation of the secretion in the cavity by quick compressions and expansions of the bulb, and no formalin used for at least twenty-four hours previous.

When the secretions have become a clear sero-sanguinous fluid and after negative smears and cultures for three successive days the tube may be removed. From 3 to 10 c.c. of formaldehyd solution should be left in the cavity when the tube is removed to act as a kind of rear guard to prevent recurrence. This solution and the resultant secretion will soon become absorbed. It is well to be governed also by the amount of secretions and sediment.

When the tube is removed care must be observed to prevent air from entering. The sinus is treated with iodin and then closed with adhesive plaster.

Summary of the forty-five acute cases treated by the closed method: Number having a bronchial fistula, 8; number cases requiring secondary operation, 1; number of cases having secondary operation before closed treatment method was completed, 5; number bilateral cases, 4; shortest time tube was in cavity, 4 days; average time tube was in cavity, 25.2 days; number of cases who had tube less than fourteen days, 18; number of recurrences, none; number of deaths (a bilateral), 1; largest amount of pus removed at operation, 7,240 c.c.; average number of days patient in bed after operation, 7; number of cases having not over three dressings, 20.

The closed method can effect cures in acute bilateral empyema, with a bilateral pneumonia present, both sides being operated at the same time which treatment is impossible by the open method.

Most cases that have become chronic following an open operation can be cured by the closed method in a short time, making unnecessary a major secondary operation of the Schede or Estlander type.

A Case of Lipoma of the Colon. (*Zur Kasuistik der Dickdarmlipome.*) Kuno Kothny, Vienna. *Wiener Klinische Wochenschrift*, January 15, 1920.

Submucous lipoma of the digestive tract is comparatively rare. Ehrlich, in 1910, found 52 recorded cases, some anatomical and some clinical observations. Of these 24 were of the colon, and 8 of them were expelled spontaneously. The others were found at autopsy, or operation undertaken to relieve intussusception.

The case recorded by Kothny was a 43-year old man who had been suffering for three months with abdominal cramps of irregular distribution. These, at first, were at intervals of a few days but became more frequent, appearing one to two hours after eating, lasting about an hour and then gradually or suddenly ceasing. In the left iliac region could be felt a firm, fist-sized movable mass, not tender. To exclude the possibility of this mass being scyballous feces, a purge was administered and, as a result, the tumor was expelled, with colicky pain.

It was found to be a goose-egg size lipoma, containing much connective tissue. The mucosa was attached to part of its surface but—as has been found in other cases—part of it was bare of mucous membrane covering.

The patient was relieved of all his symptoms and now, after four years, roentgenography reveals a normal colon shadow.

Some Clinical Types of Abdominal Tuberculosis. K. W. Monsarrat, Liverpool, England. *The British Medical Journal.* January 3, 1920.

Mansarrat presents cases, showing more or less typical lesions of the ileum, cecum and large bowel, rectum and mesenteric glands. In the ileum, one usually encounters localized ulceration, involving only a small length of the bowel. In the cecum the usual lesion is a massive infiltration, forming a large tumor, with resulting stenosis and intestinal obstruction. In the rectum one sees ulceration, infiltration or abscess formation.

In reference to the treatment of abdominal tuberculosis Monsarrat offers the following suggestions:

1. When tuberculous disease, either of ileum or large bowel, is associated with definite intestinal obstruction, operation is always necessary, and the choice lies between exclusion by anastomosis and excision. If the obstruction is acute, exclusion by anastomosis is to be preferred; if the obstruction is subacute the exact local condition must decide: a mass that is easily isolated is better removed.
2. When such tuberculous bowel lesions are not associated with obstruction; or with an obstruction that is chronic and capable of relief by aperient, the advisability of operation will depend on whether the bowel disease is or is not the sole demonstrable lesion in the body. If the lung is also affected it will probably be wiser to decide against operation.
3. With regard to disease of the rectum the establishment of an artificial anus has been recommended and practised on the ground that keeping the rectum empty affords a better prospect of resistance and recovery. Before recommending this method of treatment we should require a body of evidence that cure of the rectal disease can really be anticipated in a fair proportion of cases. When the rectum is affected above the peritoneal reflection, and is associated with abscess, evacuation of the abscess by the intraperitoneal route is to be recommended, but except for the treatment of this complication operation has no service to offer.
4. Lastly, in selected cases, operation gives good results in limited tuberculous disease of mesenteric glands. According to the extent and stage of the focus this will take the form either of enucleation or of excision of the mesentery involved, together with associated bowel.

Carcinoma of the Bladder. Bransford Lewis and Neil S. Moore, St. Louis. *Urologic and Cutaneous Review*, January, 1920.

The authors report 5 cases of carcinoma of the bladder, successfully treated by radium or x-ray. The cures vary from three to four years.

The procedure is as follows: The radium is inserted into a capsule, welded on the end of a silver wire, the whole covered by a black rubber cap. The tumor being definitely located with the cystoscope, the radium is introduced in the applicator, turned and held close to the growth, where it remains for eight to ten hours. Meanwhile, as occasion requires, the patient urinates voluntarily alongside of the catheter. The number and frequency of such applications depend on the individual case, but varies from three to four, at intervals of two to three weeks. X-ray treatments may be used in addition, and both forms of treatment may be used preparatory to fulguration or open operation.

The Application of Radium in Cancers of the Lower Genito-Urinary System. Henry Schmitz, Chicago. *The Urologic and Cutaneous Review*, February, 1920.

Schmitz discusses his methods and results in fifty cases of urinary tumors.

Tumors aside from their locality should be classed as follows, and treated accordingly.

a. Cases clearly operable;
b. Cases doubtfully operable;
c. Cases far advanced and clearly inoperable, in which ray therapy was applied only for purposes of palliation;
d. Cases in which a recurrence occurred following a surgical excision.

Clearly operable cases must be subjected to operation, but should be preceded and followed by ray-therapy. The rays properly applied cause a degeneration of the tumor cells, the chief value of which is a cessation of mitosis. The growth of the tumor is arrested. Should some carcinoma cells be accidentally left behind they probably would be harmless and could not give rise to metastases by way of the lymph—or bloodvessels.

Doubtfully operable cases, the border-line cases, should only be treated with radium. A recession of the growth so it is visibly or palpably smaller, or has become clearly limited to the organ, or has even entirely disappeared does not necessitate a surgical eradication now. If a surgical removal was attempted, either the patient succumbed to the operation or the trauma stimulated the tumor cells to a renewed activity. Intensive ray treatments could not arrest the revived proliferation.

Advanced cancer disease cannot be subjected to ray treatment with any hope of improvement; transitory relief from the symptoms may occur. One must be especially careful in the application of rays in this group of cases. The absorption of the tissue breakdown may cause such a severe autointoxication that the patient with lowered body resistance speedily succumbs to it.

Recurrent cancers should be subjected to excision if it can be safely done. The operation also should be preceded and followed by ray treatment. Otherwise the same rules hold good for recurrent cases as applied to primary border-line and advanced cases.

Late Results of the Radium Treatment of Cancer of the Uterus. J. Louis Ransohoff, Cincinnati. *Journal of the American Medical Association*, January 17, 1920.

The Wertheim operation, which was considered a step forward, is still on trial after two decades. Contrasted with the high mortality following extensive operations for uterine cancer, there is practically no immediate mortality from radium treatment, and it is available for all classes of cases at all stages of the disease. The immediate results have been good without exception in the author's observation. After two years' absence in army service, he found that of the patients he had seen in the three years prior to his absence, numbering thirty-two in all, 19 per cent. were well and free from all evidence of disease from nearly three to five years after treatment. In two cases of cancer of the body of the uterus the results were disappointing. Neither of these cases, however, were operable otherwise. Deducting the eight cases in which incomplete series of treatments were given, there was 25 per cent. relief of symptoms during this period, and in no definitely operable case was the treatment unsuccessful. He says, "We have here 19 per cent. of those patients treated from recurrence for from two and one-half to five and one-half years; one patient for five and one-half years; two patients for over four years; one patient for three years, and one for two and one-half years. The latter case may perhaps be a little too recent to be definitely called cured. This percentage of cure may seem small, but it compares favorably with that following operation. Deducting the eight cases in which the treatment was incomplete raises the percentage to 25." If cases were chosen for radium treatment with the same care that they are chosen for operative treatment, Ransohoff thinks the percentage of cures would be very much larger. There is scarcely any case so advanced that some improvement cannot be made. Radium treatment is not in itself fatal while the direct mortality from operation is over 18 per cent.

A New Operation for Suspension of the Uterus.

F. G. Du Bose, Selma, Alabama. *Southern Medical Journal,* January, 1920.

The technic is as follows: "A linen or silk thread on a full curved needle is carried through the broad ligament as a running stitch, close to and immediately underneath the round ligament, beginning at the internal abdominal ring, carried across the fundus of the uterus, engaging superficially under the peritoneal coat, passing underneath the opposite round ligament until the other internal ring is reached. The needle is unthreaded and a ligature carrier is passed through the aponeurosis of the rectus muscle about an inch from the abdominal incision, and on a level with the internal abdominal ring, through the musculature of the anterior abdominal wall until it emerges from the parietal peritoneum at the internal abdominal ring. The linen suture is threaded on the carrier and drawn through the abdominal wall.

The same technique is carried out on the opposite side. Then both ends of the thread are caught and the uterus pulled up to the desired position. Two hemostats are then applied to the thread; one on either side where it emerges from the aponeurosis of the rectus muscle. The peritoneum is then closed, the aponeurosis of the rectus muscle is sutured, and while the forceps are still in position, the linen suspension thread is tied. The placing of the forceps here described prevents the drawing too tightly on the suspension suture, which would bring the uterus too far forward, and possibly so narrow the space between the uterus and the abdominal wall as to result in hernia or obstruction. The hemostats are removed after the tying of the suspension suture. The closure of the abdominal skin incision is then completed.

The operation described has given uniform satisfaction. It has been done more than fifty times without a failure in any instance to correct the retroverted uterus. It has also been used in the milder cases of prolapsus uteri with good results, in all of which cases, however, the repair of the injuries to the pelvic floor has been coincidentally done. It disturbs the anatomy of the pelvic organs in a less degree than any of the other suspension operations. It takes the stress off the attenuated round ligaments and allows them to regain their tonicity, while securely holding the uterus in position. It neither fixes nor interferes with the normal range of mobility in any way. It does not interfere with fecundity, and it is impossible for dystocia to result in the event of pregnancy following this operation.

The area of suspension is equal to the area of support and the point of support is not concentrated in any one peritoneal area, but is uniformly distributed so that it is hard to conceive that any reflex nervous irritation should arise from it. There is now raw surface left to produce adhesions.

The ultimate disposition of the linen thread is to be replaced by a fibrous legamentary cord, due to fibreblasts thrown into the meshes of the linen thread which eventually disappears.

The Use of Free Transplants of the Fascia Lata in Surgery.

G. Grey Turner, England. *The British Medical Journal,* January 17, 1920.

The author refers to numerous opportunities that have occurred, to use fascial transplants in unusual cases. He found the method useful for protecting deep structures such as sutured nerves or tendons during the slow healing of a wound by granulation, or when the superficial tissues were so much damaged that their recovery after suture was likely to be attended by sloughing. Fascial transplant was occasionally useful for the replacement of lost tendons. It should always be used to cover exposed brain, where the membranes are deficient, in order to prevent adhesion to the scalp. In one case the author was able to repair the urethra by means of a free transplant of fascia lata. Suppuration may take place without impairing the visability of the graft. This occurred in one case of arthroplasty, in which the final result was successful.

Local Anesthesia in Neurosurgery.

Charles E. Dowman, Atlanta. *Journal of the American Medical Association,* February 7, 1920.

By extensive experience as chief of a neurosurgical team in the forward area, Dowman became thoroughly converted to the use of local anesthesia in brain and spinal cord operations. Since returning to civil practice he has used it as a routine procedure, excepting in operations on children and very nervous adults, whose cooperation could not be relied on. Preliminary injections of morphin have been used when there was not too great intracranial pressure, and in patients who had been kept under sodium bromid, given four times daily, for several days before operating. The type of local anesthesia used is a massive infiltration with 0.5 per cent. procain, to each ounce of which have been added 15 minims of epinephrin (adrenalin) chlorid solution (1:1,000). This solution is best made up immediately before each operation. For the sake of convenience the powdered procain may be kept in capsules, each capsule containing 5 grains of the drug. The contents of one such capsule added to 2 ounces of boiling water, plus the addition of 30 minims of the epinephrin solution will give a sterile 0.5 per cent. procain-epinephrin solution of sufficient quantity for the average operation. In extensive operations, however, Dowman used as much as 6 ounces of such a solution and never noticed any toxic effects of the drug. The infiltration is made by a long needle and Luer syringe of at least 20 c. c. capacity, the point of the needle extending just through the scalp above the galea. As the infiltration progresses, the scalp is raised by the underlying fluid and the needle can be further inserted during the injection along the line of the proposed incision. The scalp proper cannot be successfully injected. The infiltration is now extended under the galea and into the muscles in those regions in which muscle is present. If sufficient solution is used and at least fifteen minutes allowed to elapse before the incision is made, the patient does not complain of any pain whatsoever. No further infiltration is required if it has been massive enough at first. The skull can be entered painlessly and the brain, of course, is not sensitive. At the base of the brain, the dura may be more or less sensitive. He goes at some length into his use of the method in a radical operation for trifacial neuralgia. He has always adopted the Cushing method of approach, though the Frasier may, he thinks, be equally satisfactory. Two advantages of local instead of general anesthesia are given: first, the absence of extensive hemorrhage embarrassing the operator and, second, the absence of a relatively tense dura. He believes that the routine use of local anesthesia in this as well as other neurosurgical operations gives a larger margin of safety than the use of general anesthesia, and he has no hesitation in recommending the former.

Book Reviews

The Principles and Practice of Roentgenological Technique. By I. SETH HIRSCH, M.D., Director, X-Ray Departments, Bellevue, Fordham, Harlem and Gouverneur Hospitals, New York. Quarto; 233 pages; 343 illustrations and 22 tables. New York: AMERICAN X-RAY PUBLISHING CO., 1920.

So important has roentgenography become in medical practice, so many young physicians have recently entered this field as a result of special instruction during the war, that this complete and authoritative work on roentgenological technics is indeed very welcome.

The author has been engaged in roentgenography for many years and has had unusual opportunities for the study of its theories and its practice. This experience he has brought to bear in preparing this comprehensive, practical and profusely illustrated work on the technical side of the subject.

The book is divided into two parts. Part I is devoted to the Principles of Technic, descriptive of the electrical and mechanical principles concerned in the production of the *x*-ray. Part II is devoted to the Application of the Principles of Roentgenological Technic. It discusses *fluoroscopy, the methods of radiography, sterescopy, teleroentgenography, exposure, plate development., etc. Postures and positions* are described and discussed very clearly, and freely illustrated. For each type of picture are given the posture, immobilization and tube distance. *Exposure* occupies a separate chapter. There are also chapters on *examination of the plate* and the *equipment of a roentgen laboratory.*

Adhering closely to his theme, Hirsch gives the mechanics of gastro-intestinal exposure, but not details of barium-meal administration nor interpretation, he details the manner of making exposures of the genito-urinary tract but does not describe pyelography. We can not criticise this, but we think it unfortunate that the author omits discussion of the localization of foreign bodies, the mathematical and mechanical considerations of which seem to us to belong within the scope of a work on roentgenologic technics.

There is a complete description of Christen's half-value absorption theory, which is perhaps destined to be the fundamental method for measurement of *x*-ray dosage. The technics of roentgenotherapy, however, are not considered in this work.

We know of no better work in English on roentgenologic technic. Supplemented by a good atlas and by such a book as Holmes and Ruggles' on Roentgen Interpretation, it will provide an authoritative and reliable basis for the novitiate and an excellent reference for the more experienced.

La Rachianesthesie Generale. Par le Professeur THOMAS JONNESCO, Ancien Recteur de l'Université de Bucarest. Duodecimo; 126 pages; paper bound. Paris: MASSON & CIE., 1919.

Jonnesco believes that by the addition of strychnine to the injection of stovaine spinal anesthesia is made as safe and as satisfactory for the upper as for the lower parts of the body. This booklet, descriptive of his methods and contentions, was long delayed in publication by the outbreak of the war. Jonnesco's upper spinal injection has no following in this country, where he demonstrated it several years ago.

Les Lésions Des Nerfs. Traitement et Restauration. MME. ATHANASSIO-BENISTY. Ancien Interne des Hopitaux de Paris. Duodecimo; 156 pages; 66 illustrations. Paris: MASSON ET CIE., 1919.

As we remarked editorially (December, 1919) Mme. Athanassio-Benisty's publications are among the most important war contributions to medicine. English editions of this book and of her Clinical Forms of Nerve Lesions, prepared by E. Farquhar Buzzard, were published in 1918 by the University of London Press and Masson et Cie.

Venereal Diseases. A Practical Handbook for Students. By C. H. BROWNING, M.D., D.P.H., Director of the Bland-Sutton Institute of Pathology of the Middlesex Hospital, and DAVID WATSON, M.B., C.M., Lecturer on Venereal Diseases, Glasgow University; Surgeon in Charge of the Venereal Department, Glasgow Royal Infirmary and of the Lock Hospital, Glasgow, with an introduction by SIR JOHN BLAND-SUTTON, F.R.C.S. Duodecimo; 336 pages; illustrated. London: HENRY FROWDE, HODDER & STOUGHTON. OXFORD UNIVERSITY PRESS, 1919.

This is a convenient student's manual on syphilis and gonorrhea, descriptive of these diseases in their various stages and as they affect different organs of the body. There is a chapter on urethritis simplex (non-gonorrheal urethritis); but chancroid is not described. An appendix contains instructions for the performance of the Wassermann test and for the preparation of Gram's stain.

"Wade in, Sanitary!" The Story of a Division Surgeon in France. By RICHARD DERBY, Lt. Col., M. C., U. S. A., Division Surgeon, Second Division Illustrated. New York: G. P. PUTNAM'S SONS, 1919.

Although dealing chiefly with his own activities and those of the Sanitary Train of the Second Division, Dr. Derby has, in effect, here written an interesting chronicle of that famous division in the A. E. F.

Food for the Sick and the Well. How to Select It and How to Prepare It. By MARGARET P. THOMPSON, R. N. Duodecimo; 82 pages. Yonkers, N. Y.: WORLD BOOK CO., 1920.

A convenient little manual of recipes and instructions.

Books Received

Injuries to the Head and Neck. By H. LAWSON WHALE, M.D. (Camb.), F.R.C.S. Eng. Capt. R.A.M.C. (T.F.), formerly Capt. I.M.S. (Retired); The Queen's Hospital, Sidcup; No. 83 General Hospital; and Surgical Specialist to No. 53 General Hospital, B.E.F.; Surgeon for the Ear, Throat and Nose to the London Temperance Hospital; and to the Hampstead General Hospital. With Preface by COLONEL FREDERICK F. BURGHARD, C.B., M.D., M.S., F.R.C.S. Small octavo; 316 pages; 130 illustrations. New York: PAUL B. HOEBER, 1919.

Physical Reconstruction and Orthopedics. By HARRY EATON STEWART, M.D., Captain Medical Corps, U. S. Army, Division of Orthopedics; Assistant Director, Section of Physiotherapy, Surgeon General's Office; Instructor in Medical and Orthopedic Gymnastics and Massage, New Haven Normal School of Gymnastics; Attending Surgeon, New Haven Orthopedic Dispensary; Formerly Instructor in Corrective Gymnastics, Teachers College, Columbia University. Authorized for Publication by the Surgeon General of the U. S. Army. Octavo; 234 pages; 67 illustrations, 2 diagrams. New York: PAUL B. HOEBER, 1920.

The Narcotic Drug Problem. By ERNEST S. BISHOP, M.D., F.A.C.P., Clinical Professor of Medicine, New York Polyclinic Medical School; Member Narcotic Committee, Conference of Judges and Justices of New York State, etc. Duodecimo; 136 pages. New York: THE MACMILLAN COMPANY, 1920.

Collected Papers of the Mayo Clinic, Rochester, Minn. Edited by MRS. H. H. MELLISH. *Volume X.* 1918. Octavo; 1196 pages; 442 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY, 1919.

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SOME OBSERVATIONS ON THE POST-OPERATIVE MORBIDITY OF GASTRIC AND DUODENAL ULCER.

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Reports of highly skilled and experienced operators working in thoroughly equipped institutions exhibit the modern treatment of gastric and duodenal ulcer as one of the most brilliant chapters in therapeutics. Nevertheless it may be said with reasonable assurance that collective statistical results will average 50% of symptomatic failures. Smithies reports less than 50% of cases free from complaints and Udaondo is quoted as even admitting symptomatic failure in 72.64% of his material. The following observations are largely based upon a careful study of 162 cases of post-operative morbidity seen during the past fifteen years. The material facts impress the writer that much improvement could be inaugurated by a closer study of the problems involved and bringing these as a detailed exposition to the practitioner's attention. For instance, 112 cases had been treated from 5 to 31 years after having been informed of the diagnosis and before operation, while of the remainder 39 had been immediately submitted to operation without any more ado. A tabulation based upon replies of these patients to queries so constructed as to determine as nearly as possible the theoretical attitude of their respective medical attendants showed that general practitioners appear to be divided into two groups; the first one firmly believing that ulcer of the mid-alimentary tube is a medical problem, only occasionally requiring surgical aid; and the second group, believing just as firmly that every chronic ulcer requires immediate operation. The practical consequences are that on the one hand chronic ulcers are held for years on ineffectual or temporizing measures and until such extensive anatomical perversions have occurred that operative procedures of the first magnitude are required or that lesional erasion is out of the question.

By the best available statistics the internist is able to show no more than 40% of permanent recoveries, which leaves 60% for surgical consideration. By this token chronic gastric and duodenal ulcer is a surgical disease which, however, does not mean that the internist has nothing more to do, after making a diagnosis, than hand the case over for operation. Symptomatic failure of the 39 cases mentioned above was most likely due to premature surgical treatment or at least to insufficient medical preparation. To take a random example, a man, thirty-seven years old, giving a history of hunger pain of eight months' duration, loss of weight and constipation, went to his attendant who had him *x*-rayed. A deformed cap and antrum was found and three days later a posterior gastrojejunostomy was performed. He got up two weeks after the operation; the same pains recurred and continued with even greater severity. Eight weeks later he came into the writer's service, saying that he had lost eleven pounds since the operation. There was an evening elevation of temperature of two degrees with morning remission, a sinus in the upper angle of the wound discharging thin pus but no food; stoma open, cap and antrum deformed; *x*-ray examination of the chest showed a right hilus lesion with diaphragmatic involvement. He said he had no cough but that his wife had active pulmonary tuberculosis for the past year. 1/1,000 mg. of O. T. gave a sharp reaction. Under a mild reactionless tuberculin and general therapy recovery occurred. Forty-three of the 162 post-operative morbidity cases were found tuberculous. Dubard states that 80% of all his ulcer cases were affected with a benign but insidious form of pulmonary tuberculosis. Surely this is a matter for investigation and appropriate treatment before advising operative measures.

The etiology of alimentary ulcer is still in a nebulous state but certain things are sufficiently known to be of practical importance. It is the fashion just now to say that gastric and duodenal ulcer is due to infection because the streptococcus is found in the ulcer tissue, but as the process is not an inflammatory one it is more likely that these organisms bear the same relationship to the prime etiological factor of chronic ulcer that the streptococcus does to the tubercle bacillus. Greggio was unable to produce experimental ulcer until he had sectioned the pneumogastric nerve. He believes this leads to alteration in the cells of the mucosa which may diminish their capacity for drawing from the blood the substances necessary for elaborating antipeptic and antitrypic defences against digestion by the digestive juices. The majority present the phenomena and symptoms of hypervagatonia and our experience has been that post-operative convalescence is not only more rapid and smooth when such cases are kept mildly under the influence of atropin, but that its therapeutic power is often manifested under similar conditions when combined with rest even after operative failure. Thirty-one per cent. of the last hundred cases showed pluriglandular disturbances and since many able observers believe the endocrin system to be in some way connected with alimentary ulcer it should be a rule to apply appropriate measures in every such individual before and after surgical treatment, especially in that large group showing atonic gastric peristole.

Notwithstanding my conviction that the pathogenic micro-organisms isolated from the ulcer tissues are not the primary agent in the causation, there is no doubt in my mind, as a result of experience, that they are a potent secondary factor in the extension of cellular necrosis and in the prevention of cicatrization. I have made it a rule to examine the aspirated contents of stomach and duodenum taken during the fasting state, especially for streptococci, staphylococci and colon bacilli. The happiest results have followed autogenous vaccines in 26 cases of persistent ulcer after operation. A long period of rest also makes permanent cicatrization of the ulcerated area more certain, and this measure has served in many cases where operation with short periods of rest had failed. If the internist, aided by the roentgenologist, proceeds in a rational way an appropriate case should be either well in twenty weeks or in proper condition for the surgeon.

The rational indication confronting the surgeon is the removal of the lesion without undue risk and the correction of the resultant disturbance of motility; failing this ideal, then to provide rest and drainage to the diseased organs in the hope of securing cicatrization of the ulcer. Right here it may be said without fear of contradiction that although there are many operations done upon ulcer patients there is not enough of surgery. In the overwhelming majority of instances, to judge by the writer's material, seemingly, the operator did not intend to do anything but a gastro-enterostomy, on the supposition that the alkaline backsplash and gastric drainage would result in cure. If the trouble be taken to test out the gastric contents of ulcer cases before operation trypsin will be found in about 54% but no healing in spite of the alkaline reflux through the pylorus. The *x*-ray has long ago shown that the good effects of gastric drainage have been overdrawn. Its value is more evident when there is a coincident infective gastritis and even in those cases marginal or jejunal ulcer is very apt to follow, especially when non-absorbable material is used for suture. Since it is rare indeed to find matters in the upper abdomen either pathologically or mechanically the same in any two cases, it is easy to discern the reason for the different operative procedures proposed and practiced by equally able surgeons.

The problem of the surgical management of gastric and duodenal ulcer is so large and we as yet know so little of the intimate physiology of the involved alimentary segments, that the operative measures should be planned so as to disturb as little as possible the deviate position of the organs so frequently found in long-standing cases, because as a rule, that represents defensive physiological adaptation. The operator should try to leave the parts to functionate mechanically in principle as nearly as he found them unless the mechanical findings are evidently physiologically incompetent. Disregard for this fundamental principle of abdominal operative surgery and rough handling are responsible for many disappointments. Whether in any given case the method of Pilcher-Mayo, Balfour, Horsley, Finney, Heineke-Mikulicz, Roux, Moynihan, Von Eiselberg or any other, and to what extent gastrolysis with or without Pauchet's intercoloepiploic preparation to assure ready accessibility shall be practiced, or in how far gastric and intestinal deformity shall modify the proposed operative procedures, must be decided after all the clinical, laboratory and radiological facts and exploratory findings after section have been correllated and studied from the angle of the greatest likelihood of a complaint—free final result. Viewed from this standpoint the operator who approaches his task with the determination to perform only a gastro-enterostomy is either timid or decidedly remiss. It often happens, of course, that a short circuit is all that can be done owing to the general condition of the patient or insuperable local difficulties, but in all such cases unless the surgical attendant feels unquestionably qualified he should associate himself with a gastro-enterologist from the beginning and keep the patient under a long course of after-treatment.

The most frequent post-operative complaint encountered is pain. Many cases are reoperated with a view to separating adhesions, etc., without a preliminary study of the causes. Eleven cases of postoperative pyloro-spasm in the writer's material were cured by appendicectomy and show that adventitious causes of gastric distress were overlooked because the presence of a gastric lesion was regarded as a sole cause of the distressful symptoms. Five cases of gastroenterostomised ulcer with previously drained gall-bladders had to have cholecystectomy before they recovered. The crypts of Luschka can never be sterilized in a chronically infected gall-bladder and on account of the menace of leaving a proximate focal infection it ought always to be removed. If there is cholangitis requiring drainage this can be easily provided by incising and draining the common duct, with a better prospect of ultimate cure.

Too much attention is given to adhesions as a cause of pain and not enough to the things which may be hidden or covered by adhesions. The surgeon does not hesitate on occasions to produce adhesions of the hollow and solid viscera and does not expect pains, indeed, quite the reverse. In my experience adhesions not causing disturbance of needful physiological motility are of no importance except in so far as they hide the cause of pain. In one instance of recurring post-operative pain abdominal section disclosed a small encysted abscess resulting from a tiny posterior perforation of the gall-bladder; in another case a small abscess was encountered in the left lobe of the liver. Bottomly reports a small subphrenic abscess although no connection between it and the duodenal ulcer could be demonstrated. Minute perforations are very frequent, especially in duodenal ulcer and then posteriorly as a rule. They are apt to result in very small encapsulated abscesses as the result of minute extravasations, becoming an intermittent source of trouble much the same as abscessed tonsils. They must be searched for and disposed of whenever possible. There are those who advise against the separation of adhesions because of this danger of opening a minute abscess. But an encapsulated abscess, no matter how small, is sure to cause periodical eruptions of pain, to say nothing of the danger of leaving proximate focal infection. It is difficult to see how it can be considered good surgery to pass it by. Pain is also frequently due to chronic peritonitis and this, when not due to minute abscesses, is very frequently tuberculous. Tests for active tuberculosis should always be made in suspicious instances because tuberculin therapy will be found brilliantly effective in properly selected cases.

Although it is a long time since attention was called to the frequency of chronic lymphangitis around the celiac plexus as a cause of epigastric distress in ulcer patients, very little attention is paid to it or its simple treatment. Cases are reoperated again and again without relief. In one of the cases coming into my service, a young man had had four annual abdominal sections after his gastro-enterostomy but no relief. The pain is characteristic. It is nearly constant, but varying with the amount of exertion, not as a rule influenced by the ingestion of food but relieved by recumbency, the more complete the more marked. Other causes must be excluded. From twelve to fifteen weeks in bed with generous but bland diet and tonics has always sufficed for recovery in my experience.

Another frequent cause of distress is marginal ulceration at the line of suture or in the jejunum close thereto. In the last nine cases seen by me there was an infective gastritis and duodenitis of the streptococcus type. Any one taking the trouble to watch the average operator will notice that the fear of bleeding or leakage in the operator's mind is causing him to pull his muco-mucus suture more tightly than he would if he were suturing any other tisue. The consequence must be that pressure necrosis of some of the intervening tissues will occur. Add the predisposition to ulcer already existing, the presence of pathogenic micro-organisms, the mechanical attrition of food, and there is no reason to be surprised at having stomal ulceration. More often than is usually suspected these marginal ulcers perforate (Maccarezza quotes the Van Roojen statistics as 89%) into the jejunum, not unfrequently even into the colon with formation of a persistent fistula, eructations with a slightly fecaloid odor, the presence of skatol and indol in the gastric contents of those having colonic fistula and symptoms of incomplete intestinal obstruction are superadded to the pain.

Most of these eventually close but some cause a large amount of mischief. Obstinate marginal ulcers can at times be excised by Mayo's transgastric method, or the old anastomosis may be disposed of and a new one made. The only reliable operative treatment of rebellious fistulæ is resection of all the fistulous segments and a new gastro-enteroanaastomosis. Intermittent attacks of pain are of frequent occurrence, the *x*-ray showing spasm of the stoma with periodical stasis only during the attack. This has been shown by Zweig to be due to hyperchorhydric irritation of the stoma. A bland diet, atropin and rest quickly relieve the trouble which is often a sign of incipient marginal ulceration.

Every now and then after ulcer operations, especially after gastro-enterostomy, a patient will complain of epi-or upper mesogastric pains during defecation. These pains are always due to perigastric adhesions involving the transverse colon and can, as a rule, be relieved only by operation.

Gastric hyperesthesia complicating atony of the gastric peristole, but without continuous diminution of peristalsis, is of frequent occurrence nowadays and was responsible for five ineffectual secondary operations in the material seen by me. The composite picture is: epigastric pain aggravated by certain articles of food but sometimes even relieved by the ingestion of proteins when the case is attended with hyperacidity; nausea, at times vomiting, with relief when the stomach is empty; emaciation and weakness in proportion to the sitophobia. Roentgenography, gastric analysis and the history established a diagnosis.

Stiller has shown that atony of the gastric peristole is of great frequency, dependent on a congenital disposition and especially liable to give trouble in ptotic individuals. It usually escapes detection unless sought. The autacoid disturbances following operative trauma and the incidental psychic perturbation are preponderatingly in favor of increased chalone formation until the disorder becomes more or less clinically manifest, but it is aggravated to a degree of serious discomfort when the pernicious practice now so prevalent of coitus interruptus is superadded. This was noted in the cases mentioned. The surgeon is liable to reopen the abdomen unless aware of the supplemental etiology. All of my cases were married males. They recovered on correct sexual hygiene and atropinization. These cases of facultative insufficiency must not be confounded with that most troublesome class where ulcer operations are performed on stomachs with severe ptosis, atony and dilatation. According to Barber a midfundic tranverse stoma low down gives the best results. But only a symptomatic remission can be expected even from the best of treatment.

Motility disturbances after midgastric resection appear to be due to asynchronous gradiant rythmicity of the peristaltic waves. Alvarez suggests as a result of his studies that the lines of section be made divergant towards the greater curvature in order to remove a longer side of the greater than the lesser curvature. Otherwise the two waves will reach the antrum unevenly.

In two cases in my series Ortner's syndrome was responsible for futile secondary laparotomy about a year after gastro-enterostomy for ulcer. Both individuals were nearly fifty years of age. The operative indication was stated as periodical partial intestinal obstruction due to adhesions. The pains were mesogastric, generally three to four hours after a full meal, much distension during the attack, especially on the transverse colon, belching, nausea and constipation. The x-ray, combined with careful clinical observation, will usually clear the diagnosis. The blood pressure falls during the pain of intestinal obstruction whereas, as Brooks has shown, the pressure rises during dyspragia sclerotica splanchnica. Besides, the abdominal aorta is tender on palpation, the feces more putrid during the attacks, gastric subacidity is always present and, as a rule, the other somatic phenomena of anginal sclerosis can be found. Prolonged administration of small doses of hyoscyamin, with proper dietary and intestinal toilet, will relieve all but advanced cases.

Persistent diarrhea after gastro-enterostomy is generally neurogenous or infective. The creatinorrheic type, said to be due to adhesions of the posterior wall of the stomach to the pancreas, belongs to the latter group as separation of the adhesions alone does no good. The cases showing copious stools, need a careful functional and bacteriological study of the fasting stomach and duodenal contents in addition to the usual tests, which usually gives the needed therapeutic indications.

Vomiting as a result of vicious circle is not as frequent as it was in the early days but still occurs too often, because the casual operator is deceived in that the jejunum may be attached for some distance, as Mayo has demonstrated, from its origin at the duodeno-jejunal foramen by a definite mesentery from the transverse mesocolon or concealed by adventitious adhesions. Consequent failure to divide this allows the conditions of a loop operation instead of a no-loop operation. Either another gastro-enterostomy or an entero-enterostomy must be made in such cases. Another cause is pulling the jejunum too tight, when the duodeno-jejunal foramen especially of the slit-form is rather small, the effect being a kink of the gut at the foraminal orifice. The result is dilatation of the duodenum with persistent or recurrent bilious vomiting of considerable quantities, headaches, pains simulating gall-bladder affections; unless relieved by a widening incision of the mesenteric plica at the orifice (not forgetting its small artery) until the gut is freed from constriction, the issue is apt to be fatal. Mild cases of duodenal dilatation are rather frequent after gastro-enterostomy in cases complicated with severe visceroptosis. One of my cases had mild persistent tetany. Pelaez reports two severe cases of tetany attending duodenal dilatation. Pendancy of the two limbs of the jejunum at the site of operative junction will also cause vomiting on account of kinking or spur formation. A couple of sero-muscular anchor sutures above and below the anastomosis will prevent such a condition. That should be done where it has been omitted at the first operation. Adhesions distal to the anastomosis sometimes cause vomiting and must be divided.

Carnot, Froussard and DeMartel report a case of intermittent fecaloid vomiting following gastro-enterostomy. A gastro-jejunal ulcer had perforated into the colon with persistent fistula. The fecaloid vomiting occurred only during diarrheal attacks. The case was cured by resection of the affected parts. One of my cases complained soon after gastro-enterostomy of fecaloid vomiting at times after stooping to pick up something, especially if she happened to have on her corsets. *X*-ray demonstrated an open stoma, the duodenal lesion healed, but a patent iliocecal valve with much reflux of the barium enema. Vomiting ceased after plastic repair of the valve. Stenosis of the stoma was encountered in four of my cases, and in all of them there was a suspicious history of marginal ulceration. It is more than likely that marginal ulceration is the forerunner of stomal stenosis and atresia.

All ulcers bleed, but when one of them is labeled a "bleeding" ulcer the term visualizes a type that may lay claim to being a surgical curiosity. It prefers the rear wall of the stomach or duodenum and bleeds at times with a certain regular or even seasonal periodicity. When it determines on a profuse hemorrhage it does not appear to make any difference to many of them whether an artery is under or at a distance from, the lesion. If the ulcer be excised bleeding sometimes occurs from a new ulcer or if unable to reproduce itself that way it will bleed from the edges of the stoma. Another one may bleed profusely a number of times making operation seem imperative to patient and surgeon. He performs an abdominal section, finds that he can not do anything effective, closes the belly and then the patient makes a permanent recovery. Gastro-enterostomy has been done a great many times for bleeding ulcers and they have never bled again but many of them are not at all influenced by this operation. On the other hand, an ulcer which had never bled before gastro-enterostomy may do so in a most annoying and persistent way thereafter. These facts clearly demonstrate that the "bleeding" ulcer is not of the same nature or causation as the others. At present we are obliged to content ourselves with such opinions as seem justified in the premises. Many years' observation have led me to believe that the "bleeding" ulcer represents the lesion of dysendocrine causation. Some of my cases showed clear-cut evidence of mild hypothyroidism whereas the other type is often associated with a mild hyperthyroid activity; others hypo-adrenal, some others severe gonad insufficiency, still others the dyspituitarismic syndrome. Most of them were pluriglandular, but in some an endocrine element could not be defined. All observers agree that the endocrine system is improved by sufficiency of rest, especially in the recumbent position. Years ago I noticed that there were not many "bleeding" ulcers which would not heal when the patient was put to bed for twelve to sixteen weeks. All post-operative cases seen in the last eight years upon which a clear endocrine indication could be made out have permanently recovered when such therapy was added to the rest cure. The rest of them have not. The *x*-ray can not diagnose the earliest stages of malignancy and when a clear endocrine disturbance can not be made out the safest way is to hold a "bleeding" ulcer as a cancer suspect and act accordingly. There will not be many mistakes. Whether Balfour's cautery excision will stand the test of time remains to be seen, although the reports raise high hopes that a valuable means has been added to surgical therapy.

The surgical management of gastric and duodenal ulcer is one of the most complex questions the practitioner is called upon to resolve. The high percentage of disappointing end-results is evidence that an intensive and comprehensive study of the whole problem as it appears in each individual is the only way that the outlook can be bettered.

The Incidence of Hernia.

The relative importance of the radical cure of hernia can be appreciated when we realize that six per cent. of the adult male population suffer from some form of hernia. Nearly three million people in the United States are or have been sufferers from hernia in its various forms. A radical surgical operation, properly performed by a skilled surgeon, will cure from 95 to 98 per cent. of those so afflicted. In the hands of less skilled operators a recurrence in 10 per cent. of the cases may be expected.—Charles T. Souther, in the *Medical Record.*

PHYSIOLOGIC METHODS IN THE TREATMENT OF VARICOSE ULCERS.

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Varicose ulcers are the result of circulatory stagnation at the point where the ulcer occurs. This stagnation is the result of some obstruction in the return circulation of the internal saphenous or the femoral vein to such a degree that the normal valvular action is overcome and the whole weight of the column of blood presses down upon the veins of the leg, thus causing an engorgement and passive congestion at this point.

It may happen also that the superficial veins of the leg communicate with the deep veins by communicating branches, so that the circulatory stagnation from the backward pressure is increased by the onward flow of blood, either from the deep veins of the leg through communicating veins, or by an upward pressure from the capillaries and the vessels from the foot and around the ankle.

To correct and overcome this stagnation it is necessary in the latter type of cases, that the downward pressure through the saphenous vein be overcome, and that the excess pressure from the branches communicating with the deeper vessels be destroyed; also that the other vessels extending from the foot and the ankle to the diseased area be severed. (See figure 1).

To do this it is necessary, first, to section the saphenous vein, to cut and remove as many of the deep communicating branches as can be found on the fascial tissue of the leg, and then by means of an incision, bracketed around the ulcerated area, to cut off communication with the enlarged vessels of the foot and the ankle. All vessels leading into the ulcerated area are sectioned.

In some very obstinate ulcers, it is just possible that a deep, communicating vein may pass almost from the base of the ulcer directly through the deep tissues of the leg to one of the deeper veins.

This vessel, as a rule, can be defined. It must be sectioned in case it cannot be defined.

It is well after having followed the technic described above, to sever the communication between the tissues beneath the base of the ulcer and the deeper supporting fascia. For this purpose, a fine, narrow blade knife should be used.

There is some danger of infection in this procedure, but if the ulcer has been healed, or has been properly cleansed and prepared, the danger of infection is not great. The bracketed incision made around the ulcer should not be continuous but should be interrupted by gaps, so that some of the tissues remain free at the end of each incision, as shown in figure 1.

Some of these ulcers are very slow in healing. This may be stimulated by using skin grafts, derived from various parts of the body.

The proliferating epithelial margin of an indolent ulcer has special advantages in skin grafting:

In the first place it is very active in its growth. The need for nutrition is less, and it is able to continue growth with nutrition supply inadequate for the ordinary epithelial cells. Besides, it is accustomed to the location in which it is to be placed.

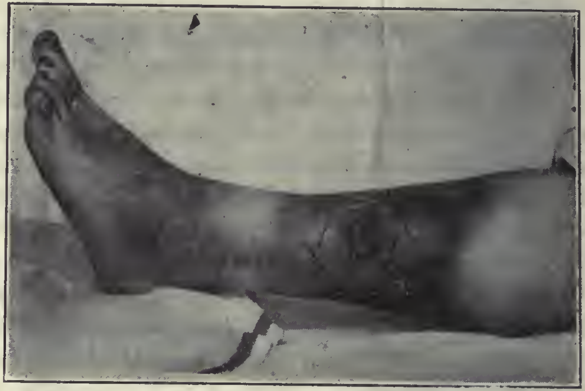
Fig. 1—Photograph showing bracketing incisions.

It has also been subjected to the bathing of pus from the ulcerated area and it is immune to the secretions produced by this area.

Its resistance is much greater than other epithelial tissue from any other location in the body.

Another factor of importance in the use of an epithelial area in skin grafting, is that the skin margins of an old indolent ulcer are not sensitive. Small pieces may be removed and the patient does not feel it.

The technic for these epithelial grafts is as follows:

The ulcerated area is rendered as aseptic as possible, and care is taken that granulations are not excessive. They should not extend above the level of the lowermost epithelial layer. If they do, they should be shaved down to a level below that of the marginal epithelium.

After the wound has been thoroughly sterilized and the granulations are again active, the knife is run along under the margin so as to lift up the epithelium bordering the wound.

After this is done there is considerable bleeding. This should be controlled by pressure. After a few minutes it ceases. From the margin, small pieces of the bluish epithelium are cut, at a distance of every quarter of an inch. They should be about a quarter of an inch in diameter.

These pieces are then placed at equal distances over the prepared area. They should not, however, be placed more than half an inch from each other.

When applied to the granulating surface they should be pressed down on the prepared bed with slight pressure. After the grafts have all been placed, the entire area is protected by an elevated dressing. (See figures 2 and 3).

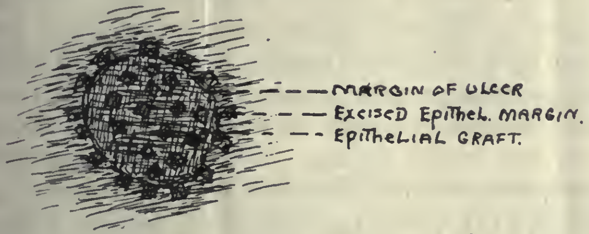

Fig. 2—Diagram of grafts removed from the margin of a varicose ulcer and applied to its surface.

Enough warm salt solution or Ross's solution is allowed to drip upon the wound through the perforated protective cello-silk to keep the wound and the grafts moist. Heat is very useful if applied with hot-water bottle over the protected surface. No pressure should be applied over the wound. Heat may also be applied by a hot-air or steam generator, so that the surrounding temperature is kept at least 90° F. to 100° F. The moist temperature as generated by steam keeps the wound surface from drying.

Above all, it is absolutely necessary that no traction nor pressure nor dragging should be exerted upon the surface of the wound. Also, the dressings should not be permitted to come in contact with the grafts.

The best method and most successful used in skin grafting is to allow the grafts to be exposed to the sunlight, care being taken, however, that they do not become dry. This exposure to sunlight may be through a glass protective dressing, an isinglass dressing, or through one of the cello-silk dressings, which are on the market at the present time. The heat may also be in the form of hot-water bottles under the bed-clothing.

The above method supplies all essentials in the healing and growth of tissues, which are, moisture, heat and nourishment.

These conditions are met first, by supplying moisture from the salt solution. The serum exuding from induced hyperemia in the base of the ulcer supplies the nourishment, (the serous transudate may be increased by Bier's hyperemia).

In some cases hyperemia may do harm by producing an excessive congestion with the formation of excessive granulation tissue.

The last requirement for growth is met by supplying the heat from the body, and keep up the external temperature by surrounding the part with artificial heat, in the form of hot-water bottles or steam or hot-air packs.

Sunlight is beneficial. We supply it through protective and transparent dressings.

The removal of the small pieces of tissue from the margin of the wound does not hinder in any way, the rate of healing of the wound, because the interval between the tags, which project into the ulcerated area is quickly filled. This interval is covered much sooner than is the interval between the individual grafts on the ulcerated area itself.

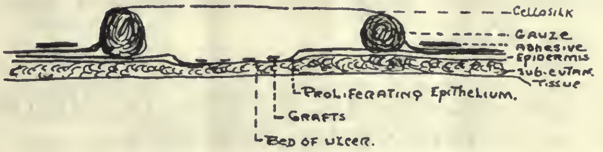

Fig. 3—Protective dressing applied over skin grafts.

The study of the drawings will illustrate very clearly the method and the technic of the grafting.

Tissue regeneration may be further increased by artificial means. In addition to the factors which I have mentioned above, there is a vital principle involved in tissue cell reproduction, in that something is present either in cells or in the surrounding media which stimulates living cells to reproduce themselves.

This substance is produced by the death of the cells of the same type as the cell stimulates. It is by means of this cellular stimulation that the cellular structures of our body are kept at the same level or are increased to an abnormal degree.

This cellular element has been termed cadaverin by Ross and other workers. Ross finds, however, that theobromine will act in somewhat the same way. After considerable study he has elaborated a paste which he applies over the areas where there is a tissue defect, in order to stimulate cellular reproduction. It works beneficially, as I have in many instances proved to my satisfaction. Therefore, in the above instances where it is necessary to perform skin grafting, possibly the application of a thin layer of Ross's paste over the ulcer base may be of value in stimulating both the growth of the epithelial cells, which we graft on to the base, and the growth of the tissue cells in the base itself.

Substances stimulating cellular proliferation are termed by Ross "auxetics." Some of them are solutions of atropine, quinine, cadaverine, theobromine. For practical purposes of application Ross devised both solutions for swabbing and a paste for application.

The solution for swabbing is of sodium chloride ½ gram, sodium citrate 1 gram, theobromine 1 gram, water 100 c.c.

The paste has the following formula: sodium chloride 0.9 gram, sodium citrate 1 gram, tyrosin or theobromine 1 gram, sodium bicarbonate 1 gram, water 100 c.c.

SOME PRACTICAL POINTS IN MINOR INDUSTRIAL SURGERY.

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Industrial surgery, especially since the compensation laws have been in operation, has come to be a distinct branch of surgery. The effort to save members, the restoration of function, as when a bone has been broken with resultant loss of joint motion, and the lesser but still important feature—both to the injured man and to the company for which he works of getting a man back to work as soon as conditions will permit, and the keeping of men at work even immediately after injuries of many kinds, have all taken on increased importance.

In dressing fingers I have found two items of much importance.

When a finger is presented mashed, more or less completely, at the end and the nail loosened or gone, the wound should be cleaned as well as possible, but if bleeding can be checked otherwise no stitches should be taken. Dress with gauze. Boracic acid being somewhat styptic as well as antiseptic, I prefer it for medication. If the traumatism is sufficiently severe and there is not enough sound flesh to strap the dressing to, the gauze is held in place by a bandage. If the trauma is not too severe it is held on by adhesive straps tightly enough applied to stop hemorrhage. Unroll about a foot of the bandage, and then begin to bandage from the roll, thus retaining two parts of the bandage, one going each way from the wounded finger by which the bandage be pulled tight on the first turn and subsequent turns as long as the extra end is needed for that purpose. When no longer needed for countertraction, the short end of the bandage should be applied in the opposite direction about the finger to the other end of bandage and an application, once around, first of one and then the other end until ready to tie bandage, and, of course, there are thus two ends to tie with, without splitting. In bandaging on any part of the body where the knot would be cumbersome, I apply in the same manner, but cut down an edge of each end sufficiently to make for a proper sized knot. The next day these *dressings should all be soaked until they fall off*; of course, sterilized water is best, but pure running water of the right temperature, under which the man holds the injured member, is generally all right, the surgeon or nurse simply removing the layers as they become loosened. It is often well to slit up one side before soaking. When the dressings are completely removed, clean the finger if necessary to remove any dirt that presents itself, dust the wound with boracic acid, cover with a thin piece of gauze, and cover this with a thick layer of cotton held in place by a finger stall. Allow this dressing to remain two days unless pain develops.

It will be found that members thus dressed heal promptly. Because of unrestricted circulation and because of free drainage, infection seldom, if ever, takes place.

The cotton as above worn makes a pad for the injured finger or toe and the man often loses no time at all from work and suffers no stiffness of the finger.

In wounds by poison barbed wire the cut, no matter how deep, if hemorrhage can be controlled, should not be stitched. The edges of wounds so caused, will be found after a few hours to have a seered-over appearance. An absolutely open and non-restricting dressing presents the best chance of good results. My own preference is cotton for the first covering after medicating, and then gauze held on by adhesive strips, using care to leave an abundance of space, not covered, for free drainage. If hemorrhage be severe, I prefer one deep stitch with heavy thread tied tight to remain twenty-four hours.

The same kind of a stitch is of great advantage in some cases where there is not known to be any poisoning, as where a fracture is suspected—of the skull, for example, where bleeding is profuse and immediate operation cannot be performed.

In either of these cases the heavy stitch is removed, in the latter case as soon as operation can be performed, and in the first as soon as hemorrhage is controlled, as in case 2555.

There are many times when men have to be treated where instruments are not at hand and experience often points to a way even if not the usual one; for example, I have found that in removing a small foreign body from the eye, when not too much imbedded, that the finger well cleansed and softened with warm water and then dried, furnishes a good means. With the eye-lids well retracted, draw the fleshy pad, say, of the middle finger gently across the eye ball over the offending foreign body and generally you will find the latter adhering to the finger.

CASE 1467, C. H. K. Injured October 27, 1915. Referred to me for examination December 22, 1915.

Left hand entirely useless, all joints of all fingers of that hand ankylosed almost completely; no voluntary movement; much lack of mobility of hand itself.

Prognosis: The man should be able to return to work in about two weeks. Hand soaked morning and evening for fifteen minutes in hot water and manipulated every second day. Returned to work on January 9. Hand and fingers perfectly mobile, and strength returning. The man has been at work continuously and the hand is in as good condition as its normal mate. He plays the piano now as well as ever. No permanent disability.

Note: This man had been in the hands of five different physicians and spent over $200.

CASE 273, W. H. H. Injured May 20, 1914. Man referred to me for examination on several occasions when in the hands of other physicians and finally on November 15, 1916, referred to me for treatment. On all the former examinations stump of great toe had remained unhealed from May 20, 1914, to November 15, 1916.

Treated with boracic acid and petrolatum vaseline and gauze held on with one strip of adhesive plaster over the end of the stump and one around the stump not tightly held in place. Improvement was immediate, but with several minor drawbacks. Treatment changed to alum salve and surglet as soon as the skin covering began to appear.

Discharged perfectly cured, all stumps, well covered with skin, May 9, 1916. When seen several months later no breaking down had taken place. A pad was made of cork, covered with cotton and finally with cloth to take the place in the shoe of the missing toes.

CASE 1707, C. D. C. An iron worker was brought in with hands covered with dirt and grease. Right thumb dislocated at first joint and bone broken about an inch back of the dislocated end, the bone having cut its way through the flesh and nearly all of the broken bone, one inch long, lying outside the skin and in the dirt and grease. The thumb was thoroughly cleaned and after again disinfecting my hands, the bone was returned to its proper place. Tendons were not torn much, if any. The thumb dressed and splinted with wooden tooth picks (a kind of splint I like and use very much on fingers and toes).

The man made an uneventful recovery with all functions of the thumb normal, and he lost but twenty-four days from work—although, of course, it was feared amputation would be necessary. The cost to the company for compensation to the man was only $10. The case shows again the wisdom of the policy which calls for trying under all circumstances to save an injured member.

In another case an engine wheel ran upon a man's heel, crushing the os calcis. In response to my pleading at the hospital where the man was taken, amputation was not performed. The os calcis came away and the man recovered with a defective foot and somewhat shorter left leg than right. By fixing a pad in the heel of the shoe, proper in size and in material, the man walks without noticeable limp.

CASE 2555. T. B. Man brought in nearly ensanguinated from a deep cut across the left wrist on the palmar side. The bleeding was profuse, the large veins at the wrist were completely severed. Two large veins were ligated and hemorrhage from the wrist controlled by deep suture. The wound was cleansed, disinfected and dressed with boracic acid gauze. The stitch was removed after twenty-four hours, cotton was applied next the wound. No more hemorrhage. The wound had been made by a meat cleaver, but no infection took place and the man was entirely recovered in twenty-four days. He worked, however, pretty continuously losing only three days immediately after the injury.

These matters are offered not as all new, but possibly presenting some new combinations of ideas.

The one thing that in my cases has seemed to save more money for the company than any other is the early and persistent and, withal thorough manipulation of joints, even before the parts are healed, taking care not to manipulate too frequently. My experience leads me to manipulate every second day, and if any inflammation is set up every third day.

(Note: Incidentally as it has been, this work was done during the period of the war.)

The two following cases were cured without loss of time or member where ordinarily amputation would have been performed.

CASE 6367. Injured April 23, 1919. Right index finger was mashed at the end, the nail was off, the bone denuded and the flesh gone for some distance, probably one-half inch. Cured with no loss of substance, and no deformity.

CASE 6381. April 29, 1919. Right middle finger crushed at the end, bone denuded, but no loss of substance. The man lost no time. Discharged cured with no deformity.

An inflammatory enlargement of the anterior thoracic lymph glands may be mistaken for a tumor of the upper, outer quardrant of the breast.

STAPHYLOCOCCIC SEPTICEMIA; PERIVERTEBRAL ABSCESS; A CASE REPORT.*

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Case History (by Dr. Gauch).

A. V., a well-built man, 27 years of age, was admitted to St. Michaels on the afternoon of September 19, 1919. He died September 21, 1919, late in the evening.

His previous history gave only an attack of influenza while in the army eleven months before.

His present history dated from the day of his discharge from the army, five months before, when he began to have frequent headaches and pain along the upper spine. About a week before he came to the hospital he began to have fever, pain in the neck and some stiffness in the neck, the arms and the legs, and he noticed an apparent induration along the right side of his neck.

Physical examination showed a well developed young man, acutely ill, who seemed to have difficulty in breathing and some difficulty in swallowing. Pupils equal and reacted to light and accommodation.

Ears: normal, and hearing good.

Tongue: dry and heavily coated. Teeth: good.

Tonsils and pharynx inflamed and granular red as sometimes seen in streptococcic sore throat.

Lungs: increased fremitus and faint bronchial breathing over small area of right middle lobe. This was not constant.

Heart: rapid and irregular; otherwise negative.

Abdomen: soft, no pain, no rigidity, no rose spots.

Extremities: arms somewhat rigid but all motions of shoulders, elbows, wrists and fingers free. Same of both hips, knees, ankles and toes; knee jerks exaggerated; Babinski reflex and ankle clonus negative.

Tenderness along sterno-mastoid on right side, increasing to sharp pain on deep pressure as progressing back to the spine, and yet no definite thickening or mass could be felt.

Urine: sp. gr. 1024, cloudy, alkaline, trace of albumin, no sugar, no casts.

Blood count: 14,800 white cells: 93% polynuclear.

Spinal Fluid: under increased pressure; clear in appearance; globulin negative; Fehling's normal; microscopic negative; spinal Wassermann test negative.

X-Ray Examination for suspected spinal caries negative; no evidence of any erosion of the vertebrae. (Area examined, first cervical to 3d dorsal).

Blood Culture: after twenty hours showed numerous colonies on both agar plates and broth, of staphylococcus pyogenes aureus.

Widal reaction: positive and prompt.

Examination of eye grounds negative.

Examination of ear drums and mastoids negative.

Temperature	A. M.	P. M.
1st day	103.2	104
2d "	103.4	105
3d "	104	105

Pulse varied between 100 and 124.

DIFFERENTIAL DIAGNOSIS:

The positive Widal reaction meant nothing, for the patient had been in the army and inoculated against typhoid and paratyphoid. Abdomen not distended; no rose spots.

Meningitis: No real rigidity of neck. Spinal fluid findings negative. Eyes and ears negative. No involvement of the extremities.

Pneumonia: The findings were too inconstant.

Deep retro-pharyngeal abscess was considered the most likely diagnosis, but examination by laryngologists could not confirm this diagnosis.

This young man was rational on admission. He rapidly became dull, then stuporous and died in complete coma.

I wish to compliment Dr. Gray on his complete and careful autopsy in this case, for, but for his thoroughness the final diagnosis would have been "staphylococcic septicemia of unknown origin."

The brain, mastoid, frontal sinuses, tonsils, pharynx, larynx and heart were, on gross examination, negative.

The lungs showed hypostatic congestion.

The liver, spleen and kidneys slight secondary changes.

I regret that no throat culture was taken during life, for in having a blood culture taken, I was looking for a streptococcic blood infection, either viridans or hemolyticus and was rather doubtful of the staphylococcus report, suspecting possible contamination.

Pathological Report (by Dr. Gray.)

Autopsy No. 68, St. Michael's Hospital.

This case was clearly one of staphyloccoccus septicemia and pyemia, the focus of infection a perivertebral abscess of neck.

The blood cultures taken before death were strikingly positive after 18 hours. The 6 agar plates were all thickly dotted with colonies, those in the depth of the media being dark in color and showing no hemolysis. The surface colonies were golden in color and were surrounded by slight rings of hemolysis. Smears showed the characteristic arrangement and staining of staphylococcus. Smears from the broth cultures showed the same characteristics and no chain formations. Subcultures showed the same. Hence, the diagnosis from those cultures was clearly staphylococcus aureus.

The post-mortem examination revealed two important findings: first, an abscess around the third and fourth cervical vertebrae, left side; second, evidence of pyemia.

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* Presented before the Essex County Anatomical and Pathological Society, October, 1919.

The abscess was revealed only after cutting through the deep muscles of the back of the neck, and the laminae of the vertebrae mentioned. The amount of pus was not large, 2 or 3 drams oozed out. It was thick, yellow, and examination showed numerous staphylococci present.

The second important finding, evidence of pyemia, was demonstrable by small peribronchial abscesses of the lungs and yellow spots throughout the spleen. Microscopic study of the heart muscle and liver showed minute abscesses in both.

Sections from the tonsillar tissue showed the presence of the pus. There was also an interesting round-cell perivascular proliferation present throughout the liver, probably syphilitic.

The diagnosis having been established we should next endeavor to trace the infection from its portal of entrance into the blood stream. I doubt if this can be definitely done. The fact that the tonsils contained pus proved nothing because most of the tonsils that I section contain pus. The whole pharynx was inflamed, perhaps the naso-pharynx was as much so.

Post-pharyngeal abscesses originate from the post-pharyngeal lymph nodes. Those nodes are found on each side of the pharynx, between the pharynx and the longus capitus muscles, and lie in front of the upper two vertebrae. Their efferents are from the nasal cavities, sinuses, naso-pharynx, Eustachean tubes, tympanic cavities, and the tonsils, although the tonsils drain more directly into the submaxillary glands. The middle ears and sinuses contained no pus and there was no history of antrum disease. The nasal cavities cannot be ruled out although with an inflammatory condition present in the pharynx and a history of diseased tonsils the most logical conclusion is that the primary focus was in the tonsils or pharyngeal tonsils.

An abscess formed from the post-pharyngeal glands would spread out in the loose connective tissue of the post-pharyngeal fossa in which or adjacent to which are found the internal carotid artery, internal jugular vein, and the following nerves—pneumogastric, sympathetic, hypoglossal, spinal accessory and farther out the phrenic. Thence burrowing backward between the longus colli and scalenus anticus muscles the pus could reach the space containing the vertebral artery and vertebral vein where pus was encountered in this case when cutting through the laminae at the time of autopsy.

From the history of the case we may conclude that infection took place in the posterior pharynx a long time prior to admission to the hospital and that symptoms were not alarming until the blood stream became infected. Just how the organism got into the blood stream one cannot definitely determine.* The septicemia was undoubtedly of short duration judging from the vast number of organisms in the circulating blood and from the very young abscesses in the organs. Many times in the later staphylococcus septicemias the blood cultures are negative since the cocci are quickly absorbed by the organs.

The staphylococcus aureus is the most pathogenic of the three pathogenic staphylococci. It gives rise to poisons which hemolyse the red cells. The principle poison, however, seems to be due to endotoxins arising from the bodies of the staphylococci themselves.

The muscles of the pharynx are innervated by the spinal accessory except the inferior constrictor which is innervated through the vagus. The muscles of the trachea and esophagus are also innervated by the vagus. I have been asked if pressure on these nerves may have caused difficulty in swallowing and if pressure on the phronic may have caused labored breathing. I believe the difficulty in swallowing was more probably due to the direct pressure from the inflammatory process posterior to the constrictors. It was a difficulty rather than a paralysis as I understand it. The respiratory difficulty was undoubtedly due to toxins affecting the respiratory centers and to extensive pulmonary congestion rather than as a result of pressure on the phrenic nerve.

A more direct route to this abscess would have been through the side of the neck posterior to the sternomastoid muscle and the carotid sheath, the route a surgeon might have taken had he known the exact condition as found at autopsy.

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* In discussion Dr. Barkhorn stated that all post-pharyngeal abscess infections reach the blood stream through the pterygoid plexus, thence into the cavernous sinus.

EAR, NOSE AND THROAT ISSUE.

The May issue of the JOURNAL will be devoted to the surgery of the ear, nose and throat, and will contain the following contributed articles: *New Intranasal Procedures for the Correction of Deformities of the Nose Successfully Applied in Over* 1,000 *Cases,* by Gustave J. Tieck, New York; *Nose and Throat Practice in Asia Minor,* by George L. Richards, Fall River, Mass.; *The Labyrinth,* by Isidore Friesner, New York; *Surgery of the Tonsil,* by Edwin S. Ingersoll, Rochester, N. Y.; *The Surgical Correction of the Aquiline or Hump Nose,* by Seymour Oppenheimer, New York; *Chronic Ear Suppuration of the Intermittent Type,* by Charles R. C. Borden, Boston; *Sinus Thrombosis,* by Samuel Kopetzky, New York; *A Discussion of the Submucous Resection of the Nasal Septum,* by W. Meddaugh Dunning, New York; *Some Endoscopic Procedures,* by Charles J. Imperatori, New York; *Nasal Sinus Surgery,* by Max Unger, New York.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

NEW YORK, APRIL, 1920.

THE DIAGNOSIS OF CALCULOUS PROSTATITIS.

It seems curious that many of the larger textbooks on urology quite ignore the subject of prostatic lithiasis, and that among others that deal with it more or less extensively, including also individual articles and monographs, differential diagnosis is scarcely considered. Indeed, it would appear from the literature that in most of the recorded cases the diagnosis was made more or less by accident.

Whether the formation of prostatic stones may be a purely biochemical process, independent of infection, has not been established. At any rate, when calculi have formed, inflammatory changes take place in the gland—fibrous tissue growth and, sometimes, suppuration. Clinically, therefore, as well as pathologically, we must have in mind the conception not merely of calculi in the prostate but of a *calculous prostatis*. The symptoms may be much like those of a bladder stone, of a bladder tumor, of a suppurative non-calculous prostatitis or of a urethritis; but though the symptoms of prostatic calculi thus vary considerably in character—and also in severity—they are sufficiently definite to lead to a correct diagnosis, if carefully analyzed and interpreted.

A fairly common, but by no means constant, symptom of prostatic calculi is pain, either of a continuous aching character or, more often, intermittent, referred to the perineum, the testicle or the inguinal region, and sometimes aggravated at stool. Such pain can be traced to its source by a systematic examination of the urine, the anus and rectum, the prostate and other genital organs, the inguinal rings and, if need be, the urethra and bladder. The pain may be referred to the tip of the penis and associated only with micturition—before, during or after the act—or with coitus. Such a symptom demands an investigation of the lower urinary tract. Occasionally the sole symptom is pain in the glans penis when the bladder is full, disappearing with micturition.

Hematuria, usually terminal, may be caused by a stone projecting into the prostatic urethra or the bladder. Whether it may be produced by calculi wholly within the gland the case reports do not make clear.

In other cases the symptoms are those of a prostatitis or cystitis—dysuria, frequency and pyuria, the first portion of the urine being especially cloudy. Prostatic massage will show that the pus comes from that organ if the symptoms arise from a calculous prostatitis. There may be even a spontaneous urethral discharge. If pus containing no gonococci is found in the prostatic fluid of an individual who has for years been free of any local infection a calculous prostatitis should be suspected.

Small calculi entering the canal from the gland may be passed on urination. Retention of urine, perineal suppuration and fistula formation are rare complications of blockage of the urethra by a prostatic stone.

Upon rectal palpation the prostate may be found of normal size and contour and not unusually sensitive, or it may be enlarged, irregularly nodular or lumpy, and exquisitely tender. "Lumpiness" and great tenderness are very suggestive, but by no means diagnostic of stones, since they may arise from other conditions. Crepitation of the concretions as felt by the examining finger *is* diagnostic.

A metallic sound passed into the urethra will encounter a stone extruded or extruding from the prostate but the sensation is of surface contact only rather than the distinct "click" often imparted by a calculus free in the bladder, which is suggestive, at least, in differentiating the two. The doubt can be further resolved by cysto-urethroscopy—which is indicated in a case with any of the above symptoms not otherwise satisfactorily explained.

Roentgenography is also an important part of the diagnostic examination. It will reveal calculi if present. If the shadows are quite small, numerous and discrete, it is a fair presumption that they are produced by prostatic rather than vesical stones. But these small shadows may be so conglomerated as to give the appearance of a single, large, bladder stone. The differentiation, however, can be made thus: If a roentgenogram of the unemptied bladder, exposed with the patient in the level supine or reversed Trendelenburg position, shows a shadow or group of shadows in the region of the neck of the bladder, and a second roentgenogram, exposed with the patient in the Trendelenburg position and the *x*-rays passing in the same relative direction, shows the shadow in the same place as before, the stone or stones are fixed in the prostate or the prostatic urethra or in a diverticulum behind the prostate. It may also be helpful in differentiating the shadows to make an exposure on a flexible film passed into the rectum in a thin hard-rubber or wooden cylindrical speculum. Lying closer to the stones than a plate under the buttocks, such a film will secure a sharper image of them. It will, too, give a fair suggestion of the outline of the prostate and of the urethral gutter. If doubt still remain concerning the vesical or prostatic location of the stones the cystoscope will settle it.

Surgical Suggestions

Lordosis and waddle gait in a child are characteristic of congenital dislocation of the hip.

Inguinal hernia in a female infant is apt to contain the ovary.

Before operating for intestinal obstruction or peritonitis, always wash out the stomach, whether or not there has been vomiting.

Acute abdominal symptoms, suggesting appendicitis, not infrequently are manifestations of the early stage of an exanthem, e. g. measles.

With a scrotal hydrocele determine, by palpation and transillumination, that the testicle is of normal size. Fluid collection in the tunica vaginalis is common with neoplasm of the testis.

Boracic acid powder dusted freely into a wound and on the surrounding skin will promptly cause the disappearance of bacillus pyocaneus contamination. Two or three daily applications are usually sufficient.

Progress in Surgery

A Résumé of Recent Literature.

Edward Bleier, M.D., Abstract Editor.

A New Operation for Pyothorax. A. C. STRACHAUER, Minneapolis. *Minnesota Medicine,* March, 1920.

Strachauer presents one of two articles in *Minnesota Medicine* on the closed method of treatment for empyema. The other article is by Manson, of Worthington, Minnesota. The author believes that the primary operation for pyothorax should endeavor to provide for: 1. Adequate drainage; 2. Approximate medication by irrigation; 3. Prevent the ingress of air and the attendant pneumothorax and cavity formation; 4. Provide negative pressure suction to thoroughly remove the discharges and to aid in expanding the lung.

The author has devised a simple trephining operation, whereby a small button of rib is removed. A snug fitting, stiff drainage tube is inserted into the pleural opening, and negative pressure is maintained by siphonage.

Strachauer claims the following advantages for his operation:

1. Trephining a rib is much more simple than resection of the ribs.
2. Mutilation, deformity, and spur formation with fixation to the adjoining ribs, is avoided.
3. Continuous, even negative pressure may be maintained, preventing pneumothorax and its attendant evils.
4. The negative pressure aids in the expansion of compressed lungs and cavity obliteration.
5. The function of all non-consolidated lung is conserved.
6. All discharges are collected in the receiving bottle, obviating the necessity of repeated dressings. This means much to the patient's comfort and cleanliness.
7. The suction prevents the accumulation and retention of pus in the pleural sac, and the absorption of the contained toxins.
8. The likelihood of introducing secondary infections is less than in open drainage.
9. Provision is made for the anti-germicidal and solvent action of the Carrel-Dakin irrigations.
10. When the infection has subsided and the pleural sac sterilized, a functionating lung capable of filling the thoracic cavity has been preserved.

Chronic Gonorrheal Seminal Vesiculitis. CLINTON K. SMITH, Kansas City. *The Urologic and Cutaneous Review.* March, 1920.

Smith presents a most rational paper on this subject. It is based upon wide experience both in private and army practice. His conclusions from his work are:

1. Involvement of the vesicle occurs in a high percentage of cases of posterior gonorrheal urethritis.
2. As ordinarily treated, approximately 75 per cent. of cases of gonorrhea become posterior.
3. Military experience has demonstrated that both of these complications can usually be avoided; but that to avoid vesiculitis it is necessary to avoid posterior urethritis.
4. Gonorrheal epididymitis is dependent upon previous vesicle infection, and to solve the problem of vesiculitis is to solve the problem epididymitis.
5. Gonorrheal infection of the seminal vesicles is largely responsible for the frequent recurrence of gonorrheal urethritis, many times long after an apparent cure has been affected.
6. In vasotomy, and vaso-puncture with vesicular medication, we have the most potent weapon with which to attack chronic vesicle infection of the gonorrheal type. It must be borne in mind, however, that a coincidental prostatitis and posterior urethritis are exceedingly common, and these must receive proper attention in order to successfully terminate the case.
7. Vasotomy and vesicular medication should not be reserved as a procedure of last resort, but should be

applied as soon as a positive diagnosis of vesicle infection is established.

8. Vasotomy and vaso-puncture is not a cure-all for all types of vesicle infection, but is highly effective in cases of gonorrheal type. But in cases of long standing, where other varieties of infection have superseded the gonorrheal involvement, and gross pathological changes have occurred in the vesicle, it is of questionable value.

9. If skillfully performed, the operation does not produce occlusion of the vas with subsequent sterility.

New Technic for Restoration of Hypospadias, by a One Stage Operation; Tunnelization With a Graft of Skin (*Nouvelle Technique pour la Restauration en une Séance des Hypospadias Etendus, per la Tunnelization avec Greffe Dermo-Epidermique.*) Nové-Josserand, Lyon, France. *Journal d'Urologie,* January, 1920.

The author reports his immediate and remote results in the cure of cases of hypospadias, by the method to be described. In 35 cases of hypospadias and 5 cases of epispadias, he was able to restore the urethra in 37. In 17 cases in which he was able to report late results, he noted the following. The penis had a normal appearance, micturition and erection were without difficulty. There was some difficulty in ejaculation, because the newly formed urethra was apt to be irregular, and lacked erectile tissue. Here is no cicatrization, because the new urethra is formed of soft skin, resembling that of the external auditory canal. As a rule the canal maintains its original caliber. Occasionally a slight stricture may form at the junction of the old and the restored urethra, but such strictures yield easily to dilatation.

The operation consists of three parts, all done at one sitting. These are, first, suprapubic cystotomy; second, preparation and insertion of the graft; and third, closure of the meatus.

1. Supra-pubic cystotomy is performed according to the usual technique.

2. The Graft. An incision 6-8 cm. in length is made on the inferior surface of the penis and scrotum, with the opening at about the center of the incision. The skin is dissected upon either side, and the urethra exposed. The urethra is incised down to the lower angle of the skin incision. A trocar is now plunged from the distal end of the urethral opening, under the superficial fascia, and out through the glans penis at the desired point, thus forming the tunnel for the preparation of the graft. The trocar is now withdrawn, leaving in place the cannula, which is used as guide for dilators to slightly dilate the tunnel prepared.

A ribbon shaped graft is now taken from the thigh. This should be about 3-4 cm. in width, and of sufficient length to fit the tunnel allowing for one-third shrinkage. The graft is now wound around a Nelaton sound, 16-20 F. according to the age of the patient. The cutaneous surface of the graft is in contact with the catheter. The graft may be wound spirally, or attached like a cigarette paper. A few ligatures serve to fix the graft to the sound. The graft and sound are now drawn into the new-formed canal by a special tunnelled sound and forceps. The posterior extremity of the Nelaton sound projects from the posterior end of the incision and serves as a drain.

3. Closure of the hypospadias opening. The skin incision is closed by means of Galli tubes and fine bronze aluminum sutures, according to the technique of Duplay, in order to avoid fistula formation.

Post-Operative Care. The usual treatment of cystotomy wounds. The bladder is kept open until the graft carrier is removed (8-10 days). The bladder closes in 2 to 3 weeks. The sutures and graft carrier are removed in 8-10 days. Micturition is at first through the perineal opening of the incision; but soon re-establishes itself through the new urethra.

The Extra-Peritoneal Abdominal Incision for Tumors of the Kidney. (*Der Extraperitoneale Bauchschnitt bei Nierengeschwülsten.*) Konrad Hoffman, Cologne, Germany. *Zentralblatt für Chirurgie,* October, 1919.

Hoffman calls attention to the difficulty of delivering a large kidney through the customary lumbar incision. To remove a kidney of unusual enlargement through such an incision, usually requires reduction of its size, either through operation or morcellation, both undesirable procedures. In addition the exposure of the vessels is apt to be rather difficult. The other alternative has been the transperitoneal incision of Saenger. This has the advantage of easy delivery of the kidney, and exposure of the vessels. However, it necessitates the division of the posterior peritoneum, and perhaps the mesocolon, with the concurrent danger of injuring the vessels to the large intestine. Hoffman proposes, therefore, an incision, that is anterior and extra-peritoneal, which combine the advantages of anterior and extra-peritoneal approach. When a kidney is enlarged to any considerable degree, the peritoneum and colon are usually pushed so far to the midline, that a pararectal incision is really extraperitoneal.

The advantages of such an incision are: 1. The patient is in the recumbent position, which is a great convenience for the operator.

2. The pararectal incision spares muscles and nerves and can easily be enlarged.

3. The exposure of the renal vessels and vena cava is absolute. The vessels can be tied in full view.

4. The exposure of the ureter is very simple and can be easily attained if necessary.

5. The suture of the abdominal wall is easy.

If drainage is necessary, it is attained through a posterior stab wound.

The Protection of the Skin from Pus, Urine, Chemicals or Any Other Irritating Material by the Use of Sheet Rubber Adherent to the Skin. Angelo Soresi, New York. *Surgery, Gynecology and Obstetrics,* March, 1920.

This device described by Soresi, is of value in thoracotomy, cystotomy, colostomy, etc. Before the operation, the intended line of incision is marked out, the skin is cleaned and dried with ether and painted with a solution of rubber cement; dissolved in about five parts of ether, for about 2 cm. all around the intended line of incision. To the skin so prepared is applied a piece of sheet rubber of sufficient size to cover the area of skin that might later come into contact with the irritating material. The sheet rubber is gently pressed against the skin, as it is done when a patch is put on a rubber glove. The surgeon then makes the incision in the usual manner, obviously first cutting the sheet rubber, then the skin and deeper structures. Along the line of incision, the sheet rubber will have adhered to the skin, so that no material that could come out of the wound, would ever touch the skin, which in this manner is completely protected from the contact with any irritating material. The application of the sheet rubber must be made so as to have the rubber adhere well to the skin. The skin must be dry before the application of the rubber ether cement, which must be perfectly dry and clean; the sheet rubber must be compressed against the skin, so as to make it adhere completely without any air under it; if the ether cement solution is very thin, it is better to apply two or three coats of it before applying the sheet rubber. Tincture of iodine should not be used to sterilize the skin. If the skin needs only to be protected for a few days, the rubber cement solution applied rather thick will be sufficient.

Post-Operative Intra-Abdominal Adhesions — Some Causes and Prevention. Arthur E. Benjamin, Minneapolis. *The Journal-Lancet,* March, 1920.

Benjamin covers the more or less familiar ground of causes of adhesions, adding to the already existing factors, the part played by oral sepsis. The most important points in his article are:

Oral sepsis plays a most important part in the causation of intraabdominal adhesions.

A preliminary period of preparation of a patient for a laparotomy should be adopted, where possible, to get the case in a favorable condition for operation, by eliminating primary foci of infection and to remove any disease that might interfere with a good recovery from the operation.

The *x*-ray should not be neglected as a means of diagnosing the condition of the teeth, as well as the size, position, mobility, and possible diseases of portions of the gastro-intestinal tract.

A laparotomy performed during which any attempt is made to correct adhesions of the abdominal viscera, may result in failure, unless the primary cause is remedied first.

A colitis must not be neglected, nor gastro-coloptosis in a case in which abdominal adhesions are present.

A bowel that is crippled and fixed in a faulty position by firm bands may have to be operated on to obtain the maximum results.

All raw surfaces should be thoroughly covered at the time of operation with unimportant contiguous structures, especially in cases where local infection or intraintestinal sepsis exists.

All infected areas must be well drained, and all tissue that will indefinitely harbor infection must be completely excised in doing a laparotomy.

Work must be performed carefully, quickly, and with as little exposure of healthy tissue to infection, from within or without, as possible.

Care should be observed to avoid injuring the peritoneum by instruments, gauze, chemicals, and rough handling.

The peritoneum must be closed in such a way that gaps or rents cannot occur.

Intraabdominal tension following a laparotomy should be near the minimum.

On the Results of Bridging Gaps in Injured Nerve Trunks by Autogenous Fascial Tubulization and Autogenous Nerve Grafts. Harry Platt, Manchester, England. *British Journal of Surgery*, January, 1920.

In eighteen operations in which fascial tubulization combined with autogenous nerve grafts, fascial tubulization alone, and autogenous vein tubulization (one case), were used, there was a complete absence of any clinical sign of recovery. The shortest period over which observations were made was four months, the longest period twenty-six months.

Secondary exploration in four cases showed complete silence of the nerve trunk to direct faradic stimulation. End-to-end suture was accomplished in all after exsection of the bridged segment.

At the re-exploration operations, partial or complete obliteration of the lumen of the fascial tube was noted.

In two specimens examined histologically, one, a tubulization alone, showed obliteration of the lumen of the tube by fibrous tissue in which no nerve fibres could be found. In the second, a graft and tubulization combined, nerve fibres were present in the centre of the obliterated tubule eighteen months after the operation. There was no sign of continuity between the proximal and distal ends through this strand of nerve fibers.

The early re-exploration of all graft and fascial-bridge operations is advisable.

The End-Results in Partial Amputations of the Foot. S. T. Irwin, Belfast. *British Journal of Surgery*, January, 1920.

Irwin notes the difficulty of fitting patients with partial amputation of the foot with even a moderately useful appliance. His experience is that partial amputations of the foot are unsatisfactory in functional end-result. Because of the loss of the anterior pillar of the arch an equinus of the stump develops. The Lisfranc operation is therefore bad and the Chopart amputation (midtarsal) is still worse. The Pigrogoff osteoplastic amputation is inferior to Syme's amputation because, among other reasons, it makes a stump so long that when a fitting is applied the good side needs to be elevated. Faraboeuf's and Guyon's ankle amputation are also inferior to Syme's. [With Irwin's judgement of partial foot amputations many surgeons in the war are in agreement.]

The Arthritides and Focal Infection. Virgil P. Gibney, New York. *The Journal of Orthopedic Surgery*, February, 1920.

Gibney discusses the subject in a general way, presenting several cases of arthritis due to focal infections. His conclusions are:

1. A focus of infection should be diligently sought for in every case of arthritis where tuberculosis, malignancy or trauma are not self-evident as causes or at least controlling factors.
2. A monarticular arthritis demands the same painstaking investigation as does a polyarticular, for one can never tell when the former may merge into the latter.
3. While the finding of a focus and the proper handling of the same may not be followed sooner or later by relief, one can not assume that the infection is at an end.
4. The arrest of the infection does not mean that the exudates in and around a joint will disappear unless orthopedic measures are employed to bring about resolution and restoration of function.
5. The finding of one focus does not mean that this is the only focus bearing on the case. It must be remembered that many organs are exposed to bacteria of a pus-producing nature and that a careful study of these organs should be the rule.

Paracentesis of Uterus in Hydramnios. (*Über Punktion des Uterus bei Hydramnion.*) E. Wormser, Basel. *Zentralblatt für Gynäkologie*, February 7, 1920.

In a patient who in four previous pregnancies had lost the child from acute hydramnion in the seventh or eighth months, Wormser attempted to relieve the excessive distension by transperitoneal puncture. By means of a small trocar he was able, under ethyl choride spray, to remove 1600 ccm. of liquor amnii. This relieved the distension slightly. However, as in previous pregnancies, fetal movements ceased a few days later. One month afterward, fetal death being certain, labor was induced by rupture of the membranes.

The author had hoped by repeated punctures to keep the distention of the uterus within reasonable limits, thus relieving the subjective troubles of the mother and also affording better circulatory conditions for the fetus.

Book Reviews

A Text-Book of Physiology, for Students and Practitioners of Medicine. By Russell Burton-Opitz, S. M., M. D., Ph.D., Associated Professor of Physiology, Columbia University, New York City. Octavo; 1185 pages; 538 illustrations. Philadelphia and London: W. B. Saunders Company, 1920.

The author quite evidently aimed to produce, for the use of the medical student and practitioner, a text-book of physiology preeminent for its completeness and practicality. He has succeeded in this effort, in spite of the difficulties of a task which necessitates the sifting and coordinating of an enormous mass of observations, experiments and literature. Success was attained at some sacrifice; a Spartan self-control alone could preserve the author from at least occasionally deviating from his course of brevity and broaching some controversial subject. Yet full cognizance is taken of all important theories, the newest acquisition from the chemical and physical laboratories are incorporated in the text, clinical applications abound, the literature is adequately quoted and even comparative physiology is not forgotten. The diagrams freely used aid conciseness and clearness. The direct application of physiology to medicine emphasized throughout, will doubtless be welcome to the medical student as an aid (by means of association) in learning physiology and an assistance in explaining much that is of importance in modern medicine.

The wealth of material dealt with does not lend itself to critical review. No originality is aimed at or attained except in the method of presentation. The illustrations are old favorites chosen, with judgment, from many classical sources. The chapters dealing with the circulation and those on the glands of internal secretion are especially full and adequate. The short chapter on the autonomic nervous system is clear and concise—no mean test of an author's ability at presenation.

Industrial Medicine and Surgery. By Harry E. Mock, B. S., M.D., F. A. C. S. Assistant Professor of Industrial Medicine and Surgery at Rush Medical College. Large octavo; 799 pages; 210 illustrations. Philadelphia and London: W. B. Saunders Company, 1919.

Industrial development has manifested itself along the lines of conservation of health to a remarkable extent during the past few years. The humanization of industry has been reflected in the development of a phase of medicine that has become a vital factor in the public health movement. No man has had a larger experience than Dr. Mock and his book is a splendid presentation of the result of his experiences together with his broad conception of the nature, theory and practice of industrial medicine and surgery.

The volume is divided into six parts dealing respectively with *Industrial Health Service, Prevention, Industrial Medicine, Industrial Surgery, Compensation and Insurance* and *Reconstruction.* Every chapter is replete with a wealth of information, statistical demonstration and constructive suggestion as regards the particular topic under discussion. Whether discussing the epidemiology of industry, the organization of the surgical dispensary, or compensatable hernia, there is evidenced a rational point of view and a clear understanding of the importance of interpreting theoretical considerations in practical terms. No single book has thus far been issued which approaches Mock's value in breadth of view or extent of practicality. The wealth of illustrative material and the carefulness of compilation make it at once a most valuable and authoritative volume for all interested in a comprehensive understanding of industrial medicine and surgery as an expression of communal effort in the field of health preservation, accident prevention, and industrial betterment in the interest of employers and employees involving numerous problems of interest and importance to the medical profession.

The Narcotic Drug Problem. By Ernest S. Bishop, M. D., F. A. C. P., Clinical Professor of Medicine, New York Polyclinic Medical School; Member, Narcotic Committee, Conference of Judges and Justices of New York State; etc. Octavo; 136 pages. New York: The Macmillan Company, 1920.

Narcotic addiction has attracted much attention particularly because of legislation and practice regarding it. The various opinions concerning the subject vary from an indictment of the drug habit as a crime to a belief in its existence as result of a disorder of personality. Thus far there is no agreement as to the basis of drug addiction nor is there certainty as to the best mode of attacking it. Bishop's point of view may be defined as follows: "A definite physical disease condition, presenting constant and definite physical symptoms and signs, progressing through clean-cut clinical stages of development explainable by a mechanism of body protection against the action of narcotic toxins, accompanied if unskillfully managed by inhibition of function, autotoxicosis and autotoxemia, its victims displaying in some cases deterioration and psychoses which are not intrinsic to the disease, but are the result of toxemia, and toxicoses, malnutrition, anxiety, fear and suffering."

Upon this definition is based a consideration of narcotic drug addiction, its mechanism and method of handling.

The chapter devoted to the discussion of the *Relation of Narcotic Drug Addiction to Surgical Cases and Intercurrent Disease,* is of particular value for an appreciation of the part that narcotic addiction may play in complicating surgical progress or in interfering with the satisfactory recovery of the patient. The author believes in the necessary administration of opiates to those who are not addicted, for the control of an emergency or for other indications recognized by competent physicians and surgeons. He also advises the administration of opiates to those with the opiate addiction disease "until such time as their disease can be arrested by competent medical care of their addiction-disease mechanism."

The entire volume is replete with illustrations from the experiences of the author and evidences his thoughtful attitude toward this group of unfortunates who are suffering from a lack of rational handling. There is a hope that the medical profession after reading this volume will make a greater and more intelligent effort to appreciate the clinical effects of this condition and endeavor to meet the problem upon a more understanding plane. It is fundamental, as well expressed by Dr. Bishop, to recognize that physician and patient should approach the problem on the disease level rather than that of inherent degeneracy or criminality. The author has made a most presentable argument that offers some degree of hope not merely to the addict but to all who are concerned with this problem.

Fatigue Study. The Elimination of Humanity's Greatest Unnecessary Waste. A First Step in Motion Study. By Frank B. Gilbreth, Member of American Society of Mechanical Engineers; Member Franklin Institute, etc., and Lillian M. Gilbreth, Ph. D. Duodecimo; 169 pages; illustrated. New York. The Macmillan Company, 1919.

The part that fatigue plays in industrial accident has received considerable attention. More stress has been placed upon the physiology of fatigue than upon practical studies to secure its elimination. For this reason Gilbreth's book is of particular value. The subject matter is developed on the basis of a long experience and represents, a rational program of simple and effective measures for attacking the fatigue problem in a scientific manner. The author emphasizes the need for fatigue surveys, the measurement of fatigue and the making of adjustments through standard practices to eliminate it by the institution of numerous devices and appliances that go beyond the ordinary efforts for the control of lighting, heating, ventilation, fire and safety protection.

The chapter devoted to motion study and the standardization of work and rest is exceedingly suggestive and possesses value in connection with the organization of hospital work. The book does not aim to be conclusive but is strongly indicative of the necessary trends in the management of workers, equipment, and tools and the motion they involve in so far as they are related to lessening the needless fatigue bound up in industrial effort. The general scope of the book is broad and the programme suggested is constructively practical.

Autobiography of an Androgyne. By Earl Lind, ("Ralph Werther"—"Jennie June.") Edited with Introduction by Alfred W. Herzog, Ph.B., A.M., M.D., Member of the New York and New Jersey Bar; Editor of the *Medico-Legal Journal.* Duodecimo; 259 pages; 5 illustrations. New York: The Medico-Legal Journal.

An *androgyne,* as the name implies, is an individual with the primary sexual determinants of a male, but with more or less of the secondary physical characteristics of a female, and with female psyche and sex inclinations. The opposite type of inversion is termed a *gynander.* Neither of these is an hermaphrodite, as the word is now used. The autobiography of this androgyne is rather the confession of innumerable homo-sexual debauches. It is not pleasant reading. It is written as a plea that the sexual invert is to be pitied, not scorned. The thoughtful physician, at all familiar with the subject, will cheerfully agree that the homosexualist is indeed to be pitied. That the invert—or the pervert (it does not seem easy to draw a line between them), whose impulses are uncontrollable, should not be segregated, that his practices are innocent of harm to those whom he induces to indulge with him, the reader of these confessions will not so readily admit. The book does emphasize, however, one important lesson to physicians, viz., not to recommend as a means of curing homo-sexuality that an androgyne should enter into marriage with a woman, or a gynander with a man. Such marriages are disastrous.

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THE ADVANTAGES OF GENERAL OVER LOCAL ANESTHESIA IN TONSILLECTOMY.*

HARVEY MAYOR BECKER, M.D.,
SUNBURY, PENN.

In presenting this paper a two-fold purpose is intended. *First,* a discussion of its title as it stands, and *second,* a means of bringing into rhinological literature a fatal case of novocain anaphylaxis. Apologetically, I wish to say in advance that it is not intended to cover a search of the literature on allied subjects, but represents wholly my own observations and opinions, based upon twenty years hospital and private practice, including my own successes, failures and end results, as well as the postoperative results that I have seen, of numerous other surgeons, good, bad and indifferent.

There are many of us who cannot and will not argue the merits of local anesthesia, and many of us who cannot and will not argue the merits of general anesthesia. We fully understand each other so long as we agree. In this meeting both groups are well represented, and it is to be hoped that the subsequently expressed opinions will start a thorough, and benefitting discussion. The advantages and merits of the various anesthetics will not be considered, as it is not dependent upon the kind, but upon whether it is local or general, as to what may not be accomplished during the operation, and with the best results and greatest safety to the patient.

COMPARATIVE ADVANTAGES AND DISADVANTAGES.

The advantages of general over local anesthesia may be stated, viz.:

GENERAL.

1. *Hemorrhage, less.*
2. *Shock, mental, less.*
3. *Shock, surgical, less.*
4. *Faucial, complete removal.*
5. *Pharyngeal, complete removal.*
6. *Trauma, muscular, less.*
7. *Trauma, blood vessels and nerves, less.*
8. *Adherence of pillars, less.*
9. *Resulting scar tissue, less.*
10. *Safety of anesthetic, more.*

LOCAL.

1. *More.*
2. *More.*
3. *More.*
4. *More chances for incomplete.*
5. *Never complete.*
6. *Trauma, muscular, more.*
7. *More.*
8. *More.*
9. *More.*
10. *Less.*

In the discussion of these ten advantages, or disadvantages, I do not expect or hope to convert any one with set mind from one group to the other, but wish to be understood as presenting them with an open mind, to the open minds of my hearers. One of the most difficult things to unlearn and discontinue in any life endeavor, especially true in medical practice, is one that has met with our convenience, economy in time, labor and equipment but without consideration of the individual whose trust we receive and whose money we take. The use of local anesthesia will come within any one of the above reasons, but at the same time against any one of the ten advantages of general anesthesia as above stated. Many of you will gainsay this. Your argument is expected and solicited. Put all your power into it, not from the standpoint of your own convenience, as I, much to my disgust have heard, but from the basis of the greatest safety and benefit to your patient.

HEMORRHAGE.

1. Hemorrhage: Needless to say, annoying and severe bleeding does not occur in a proper, total. removal of a faucial tonsil, hemophilia excepted, but will certainly occur in the event of undue injury or cutting of mucous membrane, pillars, fossa or incomplete removal. This is so universally true that after the snare has passed behind the tonsil, as was expected, and bleeding persists more than a minute or two, it is my custom to search at once for a stump, and always find it, unless I know that I have erred in technic in the separation or application of the snare. Since the advent of aspirating apparatus, such as is available today, one need not hurry for fear that the patient will come out of the anesthetic, nor that the blood will flow into the trachea and lungs. I have an especial advantage from the fact that I have assembled the good parts of several aspirating devices, giving at the same time either warm or cold ether, under pressure gauged from zero to any desired amount; pure, or admixed with air or oxygen, or both; aspirating to any required amount of vacuum, and furnishing air, heated to any desired degree, flowing either from its natural tendency to rise above the cold, which is considerable in the presence of cold ether vapor, or driven by any amount of pressure up to fifty pounds, and certainly a valuable aid at times, to check an annoying oozing. The device is safe, being electrically heated in completely en-

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*Read before the Section on Oral Surgery and Dentistry of the Interstate Association of Anesthetists, during the Fifth Annual Meeting, at Cincinnati, September 15-17, 1919.

closed case and remote from the patient. The ether heating device is hot water and safe, rather than an electric heating unit beneath the ether bottle, which unfortunately on several occasions within the knowledge of some of my hearers has proven itself a dangerous equipment. All these parts I have mounted into or upon one cabinet, under the absolute control of the anesthetist by a single foot switch. The ether bottles are available, one warm, one cold, controlled by a three-way cock. Two aspirating bottles of one gallon each connected in series, and with vacuum gauge permitting instant regulation in amount of suction, scarcely permit flooding by overflow even when doing a rather large number of operations. This of course depends upon the quantity of water required to keep the aspirators free and unobstructed. Under, and with such devices careful and gentle separation of pillars and plica is possible in most instances. There is no interference by edema, such as results from injecting local anesthetics, nor swallowing with consequent movement of pillars and tonsils, an empty act or with blood and mucus, no gagging, no desire or necessity to spit, no moving of patient from being, or fear of being hurt—in fact, the entire absence of annoyances so many times present by any other method than general anesthesia.

What seems to me one of the greatest incentives and advantages is, that what bleeding will occur is at the time of operating, and not secondary, two or three hours afterward, when the blood returns to the vessels from which it had been driven by the epinephrin in the local anesthetic, and in which vessels there is no clot to prevent a secondary flow. This unimpeded bleeding it appears to me, is a direct result of the interference with nature's method of control, namely, retraction and contraction of the vessels, holding the usually present fibrin in the blood, in quantum sufficiat to form a clot. The use of sufficient epinephrin to control bleeding, precludes the presence of blood for some time, and on its return finds the vessels standing open, not unlike broken water pipes, more or less fixed, and incapable of, or at least not showing any great tendency to retract or contract at their severed ends.

Avoiding reports in literature, with which you are all familiar, I beg to give my personal experience as being called to the hospital once in every two thousand general antsthesias, and once in every ten local anesthesia operations, because of a secondary hemorrhage requiring treatment. This proportion might have been greater by the use of common sense and good judgment about ten years ago. Upon the complete removal of a tonsil for a patient about twenty years of age, a large mass of apparently varicose veins was seen in the fossa on the right side. No bleeding was present at the conclusion of the operation and lacking good sense, I did not tie off the entire mass. Injury, separation from their connective tissue base on the tonsillar side, as well as the removal of support, permitted a large break in several vessels, apparently synchronously, and with an alarming hemorrhage. These figures apply to tonsil operations only with a total of nearly eight thousand.

I would not have you feel that I know, or think I know, how to use local anesthetics, because it is possible that I do not: and it is also possible that I do not know how to operate with or under local anesthesia. These are, however, my experiences, and you may feel assured from what has been said, and more from what follows, that I have discontinued tonsil surgery under local anesthesia.

Several years ago in a friendly discussion with a general surgeon of unquestioned repute, admired by the profession and the public, holding a lucrative state position, within the hearing of one of our members, now present, whom we honored at one time with the Presidency of the Pennsylvania State Society, unburdened himself somewhat in this manner, viz.: "Any man who anesthetises a child and in its helpless state entirely removes its tonsils, is a criminal and should be in jail. The hemorrhage from such operations is terrific." (?) (This may not be the exact word used.) He then continued, saying: "Dr. ———, after an operation of this kind sat all night by the bed-side holding a gauze sponge in the throat with his fingers, and in the morning said: 'Thank God, she lives'." My reply, before proceeding with this paper. "Any man who wraps a child into blankets, placing it into a restrained though struggling position, its body held by an assistant, the head by a nurse, and with the smear of weak cocain solution over the tonsils, proceeds to shave off the projecting part, leaving the buried part in situ, is a brute and ought to be shot before he can cripple more children." The surgeon quoted by him lives in a neighboring state; has been before us for a number of years for his unquestioned research work; was called into the general advisory board or council during the recent war; has been meritoriously honored by title and medals for his valued service, but his knowledge of the proper removal of tonsils, which results in such dangerous hemorrhage as well as to methods of control, must be very limited, or he would not sit by the bedside all night holding a sponge, facing death, but would proceed to control it. **In the past**

I have understood that he would teach you how to remove tonsils in a week. I do not feel that it is now compatible with his usual sound judgment, or within his province to advise against general anesthesia and complete removal. His opinion should be passed as having missed its mark in the "I'll set you right" attitude in which some of us have been pleased to place him.

MENTAL SHOCK.

2. Mental Shock: By this I mean the shock to the conscious mind of the child which is being held tightly in its roll of blanket, undoubtedly being hurt, perhaps more by seeing the approaching knife, or other aimless instrument, than by the shaving off of the projecting part of the tonsil. This mental injury is greater than the physical. Visible bleeding usually does not have a very sedative effect upon any child, especially if produced by one whom it knows as "Doctor." Neither of these will obtain under proper and humane methods.

Digressing, I beg your indulgence of one good example of such operative methods by a general surgeon. A boy about 6 years of age, had his tonsils "skinned off," while securely rolled into the blanket. Adenoids not molested. Following the crude proceedure, frequent sore throat occurred, and I have the information from his physician that it was not possible to see his throat for several years, and that upon request nervous symptoms became manifest that precluded insisting. At the age of 11 years, resulting complications from the bungling operation as well as its incompleteness, caused an acute suppurative ethmoiditis. (It may have been chronic with acute exacerbation.) An abscess pointed nearly at the alae of the nose, was incised and drained by his physician, and closed spontaneously after several days. At the same time edema of both lids, some redness of the globe, soon followed by proptosis of marked degree, loss of vision preceded by diplopia, insomnia, some stupor, in fact sufficient evidence to warrant immediate operation for ethmoidal disease. His fear of hospital, nigh unto a phobia, caused, in my opinion, sufficient delay to produce retrobulbar abscess with extention to, and involvement of, meninges, so that late operative interference was without avail, death resulting in less than 48 hours. At operation it was found that the previously incised abscess had its source in the anterior ethmoid cells. My argument is that with proper tonsil surgery the lad would be alive. You may say earlier ethmoid operation. I reply, he should not have had ethmoiditis. Some may argue that the fault lies with the operator, rather than with the anesthetic. This phase I hope to cover in its proper place. Operated under general anesthesia he would have permitted inspection of the throat and would not have had a hospital fear. I contend, therefore, that this lad is dead because he was so unfortunate as to meet a local anesthesia general surgeon.

SURGICAL SHOCK.

3. Surgical Shock: In my experience the shock under ether is probably greatest at the end of the first twenty-four hours. By the end of the second twenty-four hours the ether patient has practically recovered, and the local anesthesia patient is right in the midst, and that two or three times the length of time is required for recovery. It is further doubtful in my mind whether a child ever fully recovers, the severity of the surgical shock seemingly adding to, or producing a mental element, certainly not to be desired in your or my child. This, of course, does not occur in every case, for which let us be thankful, but one in a hundred is too many, especially when that one may be avoided.

COMPLETE REMOVAL.

4. Complete Removal of Faucial: This is a more difficult procedure than many men think, or of which they know and appreciate the value. The quiet, flexible and pliable throat lends itself to the most delicate manipulation, without interference with the required succeeding steps leading to complete removal, with a minimum of trauma. Not so, in my experience with an injected and edematous throat, more or less constantly kept in motion by even the most willing and best patient, constantly defeating the surgeon's utmost efforts and skill at what can be made a harmless manipulation of the remaining parts. Probably the greatest damage is done when the snare is passing through in a slow method, as usually if a slow method is used, it is at this time that the patient has a desire to gag or swallow, probably from traction on more remote structures, consequently moving either the throat musculature or his whole head or body, a movement impossible to follow, and necessarily causing stretching or tearing of muscle fibers that can and should be avoided.

One patient vomited with a snare drawn taught, with tearing of muscle fibers. The rapid snare removal certainly will tear tissue that had better not be torn, and undoubtedly predisposes to bleeding. The knife dissection, to which local anesthesia so nicely lends itself, I feel cannot be mentioned except to condemn, as it so frequently is followed by the adherence of the pillars. With the attending edema, moving muscles, and by this time slight, or even considerable bleeding, obscuring the field, minute inspection for small remaining stumps becomes difficult and uncertain. The attempted use of an aspirator in local anesthesia work has not proven satisfactory to me. If swallowing could be prevented the annoying throwing back into the fossa of a well everted tonsil would not occur very frequently, possibly would be entirely prevented, but unfortunately it very frequently so happens that the patient thinks it a good opportunity to swallow while one reaches for the snare.

REMOVAL OF PHARYNGEAL TONSIL.

5. Complete Removal of Pharyngeal: This is comparatively easy if care is taken under general, but I wish to say that I have never seen a clean removal under local, either in my or the work of others. If you have any idea that complete removal is the rule, take my advice and never make an examination of the pharynx with the pharyngoscope unless you wish your conscience jarred. At times I thought a complete removal of the pharyngeal tonsil had been accomplished, but several weeks later an examination with the pharyngoscope sent something up my spinal column with a sensation of an icicle, well crowned at the top with a feeling akin to having taken money under false pretense. And this is not the end. How about the possible eye or ear complication? How about the resulting deformity of the septum, jaws and teeth? Have we put the boy beyond the line of rejection for future military service? I need not give the answer; you know it.

It appears there are surgeons who are especially fond of showing MOTHER the "Adenoid," and what she sees, usually, is a little, nearly round mass about the size of the end of her finger, with the remark: "My! Isn't that large," not having the least idea if it should be the size of the peach or only that of the contained seed. The surgeon with a faraway, knowing look, and with great eclat accompanied with a respectful bow replied, "Yes Madam," takes her money, lets her depart in good cheer with the idea and understanding that she has done her duty by having the much heard-of and more dreaded adenoids removed from her boy, and feeling that now he will not be handicapped by retarded and defective development, with slowed mentality, but in position to vie with his companion who had to have the harrowing experience of taking ether and remaining in the hospital for several days, just because the other surgeon was not well versed in the recent refinements of the throat specialist, and did not know how to do it. This is not an idle jest. We frequently receive these compliments from the inferior quality residing in a larger city.

We are content that we are free from guilt, and the only pleasure attached comes when the boy fails to progress, and we have the opportunity to thoroughly clean him, and give him our best belated start, with less gold, but a good result and a clear conscience. School inspectors frequently report tonsillar disease, and are informed by the child or parent that they have a biased mentality as "the tonsils and adenoids were removed a year ago." A child suffering chronic eye disease directly resulting from tonsillar necrosis, said that the school inspector has told her she has diseased tonsils and that she "Had a notion to spit into his face as she had been operated upon over a year before." She had a good mutilation, but the offending, much decayed faucial remnants and all but two or three of the central lobes of the pharyngeal were present. Pressing the truth to her mother caused a burst of anger. The father, considered the leading dentist in his village, offered the statement, by way of mild rebuke, that his friend who did the operation is as good as anything we could show in our community. Not having made any comment concerning the surgeon except result, there was no opportunity for reply, but we entertained the pleasant thought, "let us hope." Her failure to recover from the eye disease, and the failure to convince the parents lost the patient. She now wears glasses and I have been informed that she has had her tonsils removed twice since that time, as they "always grow back again." All I can say is "Poor kid." This has all been local anesthetic work. You will say you have seen the same result under general, to which I agree, and further beg to say, to the everlasting disgrace of our specialty, that not half of the bungling is done by the general surgeon when he wanders outside his own sweet pastures, but by some of the never dim and brilliantly shining lights of the metropolis. New York's report of seven per cent. of clean work would substantiate this statement.

TONSILLECTOMY IN THE ARMY.

It seems to have been a sort of pleasant passtime to remove the tonsils of the "boys" in the army, especially at some of the cantonments. I understand that it was usually done under local anesthesia, that usually did not anesthetize. A few of the throats examined would indicate that something went wrong. Quite a large number of the operated men in my community have 'phoned my secretary during my illness and absence, and the opportunity of inspecting has been lost to me for the time being. Something must be wrong or they would not ask to see me. People usually are not in the habit of consulting physicians with excess rates unless something hurts them. I have done several septal resections to remedy postoperative synechia, the result of the "Chief" sawing off a ridge or spur, traumatizing, in one case the inferior, and in the other the middle and inferior turbinates. Apparently the ridges had "Grown back again." The few throats I have seen are about on a par with this nasal surgery. If this signifies the Chief's work, what may we find from the subordinates?

One thing is already manifest. Many men who never removed tonsils before they went into the service, and while there spent their time with a lap-board, when they were not busy holding puspans, and carrying soiled dressing receptacles, are returning and diving into the specialties like a finished product. We may expect an outbreak of local anesthesia tonsil operations, much inferior to the usual standard, with the consequent and attending results. Business should improve for the man who can deliver the goods under such a stimulus, but at whose health and expense? I think it is our plain duty to deter these men until they have mastered the art. Give them all the opportunity and assistance possible. They are good men with good minds, otherwise they would not have been in the service of Uncle Sam. Rarely came the opportunity, in this war, for the man who did not operate at home with at least the average skill, to begin in the service. Other duties were found and imposed, returning him well filled with useful knowledge, and probably writing the most legible hand within his life. They have seen much and learned much, and with adaptability will learn rapidly to skillfully do those things in which they will now fail if permitted, in common parlence, "To go off half cocked," forever shattering what might have been built into an enviable reputation. We should advise and remind them to qualify in shooting before they go out to the range to capture the prize. Seemingly it is clear that for the elevation of the standard of the profession, and especially the specialties, as well as for the protection of an unknowing people, the guidance with an ever uplifting hand becomes our duty.

TRAUMA.

6. Less Muscular Trauma: This is sufficiently covered for the scope of this paper under No. 4, except that I should like to suggest that if we are going to operate, let us attempt to cause the least destruction to the parts involved, consistent with complete removal of the offender.

7. Less Trauma to Vessels and Nerves: The element of time possible for cautious and gentle procedure, in a quiescent and not edematous throat, enables one to throw back, or over, and out of danger, the teminating branches of vessels and nerves, evert the tonsil, and snare it without making traction causing tearing of either, a something rarely possible under a local anesthetic and with a conscious patient. If the operations could be done by both methods, and the end results compared, local anesthesia would be placed upon the bargain counter, by those who operate for the welfare of the patient, rather than for his money. Plethoric patients court bleeding their bodies, but not their purses. The advantages of general anesthesia would soon become known, and the advocates of local anesthesia would be forced into line or take the risk of an emaciated purse.

It is rather difficult to compare or draw conclusions from the inspection of different patients, as rarely two throats are alike, or the postoperative appearances similar. Several good examples have been available in my practice. An attempted local removal had to be abandoned after one tonsil was apparently completely removed. Later ether was given for removal of the other, and I regret that the abandonment did not become necessary sooner. On critical inspection two buck-shot sized remnants were found, having been concealed by the edematous pillar. Further discussion naturally falls under the next heading—

ADHESIONS AND SCARS.

8. Less Adhesions of Pillars, and 9, Less Resulting Scar Tissue: I have never made an attempt to operate on a child under a local anesthetic. This, for several reasons. I could never bring myself to believe that any child would hold sufficiently quiet to perform a minimum traumatizing operation, even with perfect anesthesia, or fool enough to hold for complete adenoid removal, not considering the danger of such instrumentation, with a moving head, as may be necessary behind and above the soft palate, and before I "roll the blanket" I cease operating. Not having children from which to draw conclusions, except those I have seen who had been operated upon by some other surgeon, I shall be as lenient as possible in my comment, fearing to appear in the light of a critic, in a matter in which I have not engaged and have unsoiled hands. It has been my good fortune to reoperate on two or three dozen children from one charitable home, who had had local anesthetic operations previously

and none of whom had any one of the three major tonsils removed. Numerous other children, most of them done at large city hospitals did not present, as a class of postoperative throats, any material difference. An excessive amount of scar tissue, in the fossæ and without, pale, thin, scarred muscles, sometimes the anterior pillars, but more commonly the posterior, and not infrequently both cut with a large percentage with adherence between the pillars. Postoperative aching throat was a common symptom, evidently resulting from pressure upon the entangled teminal nerve filiments.

With adults, wherein I also have unclean hands, the same symptoms and appearances are present, but to more marked degree; in many cases of others as well as mine the scar is very large. This is why I previously said that I am sorry forced abandonment under local did not arrive sooner. Without apparent difference in the tonsil removed under local and that under general, the postoperative difference is most marked, certainly not the best result to be had for the patient, nothing about which to be proud. Possibly greater mutilations are seen as having been accomplished under general anesthesia. One cannot conceive how any patient would be held for some of the mutilations I have seen.

As an example, young lad, 17 years, half of soft palate, entire uvula gone; over one inch of one anterior pillar lost, and adjacent posterior pillar cross sected, the resulting contracting scar almost completely closing the pharynx, necessitating mouth breathing, and to the further shame of the operator, half the tonsil on this side, and the entire on the opposite remaining. Another by the same "picture-book" general surgeon, all pillars cut with resulting sagging larynx below the sternal notch. These caused two sleepless nights for the "hatchet and saw" carpenter owing to profuse hemorrhage, which could be expected. My understanding is that he collected his full fee, five dollars each, and made no additional charge for remaining at the house all night. The size of the fee indicates the amount invested in preparation. Results like these cannot be attributed to the shortcomings of an anesthetic, but directly to the mutilator.

SAFETY.

10. Safety of the Anesthetic: For many years I have had within easy reach in my office, a 38 calibre pistol for which I have the greatest amount of respect as to efficiency, reliability, harmlessness and compliance to my will. It remains entirely harmless in its fixed position, and in the hands of a man competent in the handling of such a weapon. When recklessly handled, or by an incompetent who will point it in your direction and pull the trigger, causing your immediate death, and then advises your dependents that he "did not know it was loaded," it becomes a mighty power for destruction. A pistol never killed any one of its own accord.

I have a similar feeling of respect for ether. I do not believe it ever killed anyone of its own accord, but that it was always destructive because the man handling it made it so; not the gun; not the ether, but the man behind it. My feeling of security has always been vested in the ether, and if any doubts were entertained, they pointed to the anesthetist. When the anesthetist goes to the movies, or takes a trip to the Jersey coast during an administration to a patient, and as on one occasion in my experience I suddenly said, "What's the matter, the patient is not breathing," I received the reply: "By George, that's so," ether becomes dangerous. It might become very convenient to say, in the event of death, that it was caused by the ether, yet the ether was only an unwilling accessory to an incompetent and unreliable gunner.

Though numerous drugs used for local anesthesia are supposed to be free from danger, and though administered by my own hand, I am not able to feel that they are wholly safe at all times. They might be unsafe from their own toxic or anaphylactic reactions, or by reason of error in their preparation or administration. It is possibly not beyond the memory of some of you, and you may recall, an incident, an error, an unexpected reaction or result, whereby some patient took the silent route. I am able to remember a friend and well known physician, one whom I always held in the highest esteem, and with whom I had spent many pleasant hours in my University days, who most unexpectedly took the silent leave by the route of a druggist's error. My feeling is that he should be attending this session of our society, had a general anesthetic been selected for his tonsillectomy.

DEATH UNDER LOCAL.

This brings me to the second reason for presenting this humble paper—the death of a friend and patient under a local anesthetic. Just two years ago Mary S. ——, 27 years, and Elfreda S. ——, 25 years, sisters, brunette and blond, respectively, came to the hospital together for the removal of pathological tonsils. Both in good health except moderate chronic hypertrophic rhinitis and beginning ear complications, manifested by tinnitus, and slight reduction of hearing. Elfreda had also moderate intestinal toxemia with manifest exacerbations several times a year. Partly submerged and necrotic tonsils were present in both, differing principally as to size, rather than condition. The choice of the anesthetic was left to me, and knowing both as fearless and most pliable and confident patients, I selected a freshly made sterile solution, half of one per cent. novocain, as it was at that time called, to which fresh, 1 to 1,000 adrenalin chlorid was added, ten drops to the ounce. For some unexplained reason, Mary was first called. Three drams of the half of one per cent. novocain solution was poured out of the sterile, glass stopper bottle into a sterile cup. About two and a half drams were injected around the tonsils, both superficially and one deeply behind the tonsil, according to my usual custom; the points of injection being selected in accord with the location and course of the nerve supply. Without incident a clean and painless enucleation was accomplished, unattended by either operative or postoperative hemorrhage. No toxic symptoms were present during or after operation. The entire procedure consumed about 15 minutes. She was returned to her room and Elfreda brought by the returning nurse. All tight clothing had been removed. An entire change of sterile linen, instruments, gowns, etc., was made. Into another sterile cup was poured two drams of the novocain solution, from the same bottle. No change had been made in the solution, and the possibility of its having become infected cannot be conceived, it being handled by a sterile nurse who had not removed it from its sterile towel wrapper, nor had the bottle been touched by her except with sterile towel covering her hand. About 100 minims were injected in the same manner and at approximately similar points as at previous anesthetizing of her sister, she, during the time laughing and joking, as was her custom, and absolutely without fear. I mention this fact because it has been suggested by numerous men that the psychic effect may be greater than the toxic, and contributing cause, as well as an added factor in unexpected and toxic reactions. Be this as it may, in about three minutes after the last injection and before any operative procedure was or could be begun, a slight convulsive movement involving only head and neck was noticed, followed in a few seconds by a more severe and extensive, including shoulders and possibly chest and upper arms. These were almost immediately followed by more violent attacks, so that the fifth or sixth resembled in its general character the violent leaping of a frog, with resulting overturned chairs and stools. Tightly holding her about the waist I succeeded in putting her on her back on the floor, from which a nurse and I at once found ourselves lifted, and were not able to prevent a violent head bumping. Tightly closed jaws, some frothing at the mouth, slight biting of the tongue, dilated pupils, fixed globes, wide palpebral fissures, excessive lacrymal flow, stertorous breathing, moderate, but soon marked, cyanosis, passing of the violent convulsive, seizures into a marked and general tremor, with occasional jerking of one or the other foot, flexion of the forearm on the arm, legs not flexed on thighs, thumbs tightly pressed into the palms, simulated somewhat an epileptic seizure. Cardiac action not materially abnormal, except in rate, reaching in several minutes 120. Respiration ceased in several minutes, preceded by prolonged expiration, and with a regular but rapidly decreasing volume of air. Two most excellent internists were called and responded immediately. Artificial respiration had been begun immediately upon the cessation of respiratory effort, with oxygen, atropin, rectal dilation and infusion, heat, posture, in fact all, within the combined knowledge of the two consultants, five nurses and myself, was done. All these efforts were fruitless, as we did not succeed in establishing a single voluntary respiratory movement. Complete paralysis of the respiratory center evidently having occurred. Respiration ceased in not more than ten minutes from the beginning of the convulsions, and to me it seems curious that the heart could be distinctly heard for three hours, and by gradual reduction became inaudible at the end of another half hour.

My knowledge and experience in this line is limited to this one fatality, for which I am duly thankful. To be a specialist in this branch of life-saving, does not constitute one of my desires. In a limited way, mostly by requesting from many of the large medical journals, any article bearing upon such fatalities, I have succeeded in finding five previously reported deaths, four in American and one in Italian journals, and have gathered the additional information of another at the Mayo Clinic, which I understand has never appeared in the printed clinic, issued by them. Through a shell-shocked, returned, Russian surgeon, I have the information that in Petrograd alone, one hundred and fifteen fatalities resulted in three weeks, during his service there in the Russian army, from the use of novocain, a German product imported through Sweden. From the quantity imported, distributed, and used at many points distant from Petrograd, from which reports were not obtainable at the time of his discharge from the army and return to America, he thinks that probably thousands of lives were sacrificed before, the more than likely, intended toxicity was discovered. Two reasons for not believing that I had an intended toxic product are that I purchased the novocain in compressed tablets, ten in a vial; the fifth caused this fatality, and the solution of the same tablet injected in twice the quantity, did not cause symptoms in the sister of the patient but fifteen minutes before this death. In my ignorance I can think of anaphylaxis only, as a possible and probable answer.

Aside from the better quality of the work, the greater assurance that something has been done for the growing child that will enable him to keep pace with the more fortunate, and the adult with the symptoms and fixed evidences of chronic sepsis, not cured, but repaired and put into the best possible "running condition," with the least resulting contraction and deformity from scar tissue, and one such fatality to remember, when I know that this girl should be alive and in her place as her gray-haired mother's constant companion, is sufficient to make me think only of ether, reliable, faithful and safe, with a reliable and well trained man behind the gun.

SELECTIVE ANESTHESIA.*

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The recent improvement in the mechanical factor has greatly facilitated a more accurate study of the action and effects of our various anesthetic agents.

At present we can deliver to the patient a drug or drugs of known standard chemical composition and quality in a definite concentration, at a definite rate either singly or in combination. This fact enables us to make our observation on a more scientific basis than was heretofore possible.

The personal equation still remains the unknown quantity and a closer study of body reaction to our available anesthetics is desirable. The anesthetist should be acquainted with the general physical condition of his patient, know for what he is to be operated and the probably severity of that operation, and select for that particular patient the anesthetic or anesthetics which will not only assure a satisfactory condition during the operation, but will restore that patient afterwards, as far as the anesthetic is concerned, to a condition as near normal as possible, as soon as possible. Therefore to obtain the best results, the anesthetist must not be merely a *technician, but a keen diagnostician and prognostician as well.*

DIFFICULTIES IN SELECTIVE ANESTHESIA.

Unfortunately we cannot always select for the patient the anesthetic which will do body tissues the least harm. This is so mainly because of mechanical reasons and inability to deliver sufficient concentration of gases, or to obtain proper relaxation where the lack of relaxation counterbalances the evil effects of the anesthetic used. The main factors to be taken into consideration in selecting the anesthetic to be used are:

1. General condition of the patient.
2. The nature and location of the operation.
3. The operator.

For convenience the first may be divided into several groups:

A. The healthy patient who comes for operation for some condition not effecting his general health, i. e., hernias, varicoceles, etc.

B. The toxic patient.

C. The shocked patient.

D. Patients with impairment of vital organs, i. e., kidneys, heart, blood vessels and lungs.

GROUP A.

A very large number of our patients will fall under Group A. These patients take most any anesthetic equally well without any evident permanent harm provided they are not over-dosed or over-shocked at the time of operation, yet personal comfort is important in these cases and must be taken into consideration in selecting their anesthetic.

In about ninety per cent. of healthy patients gas-oxygen is the anesthetic of choice, while in ten per cent., ether is the anesthetic of necessity. No other anesthetic in our armoir has the wide range of application with the same degree of immediate safety, producing ideal operative conditions in all classes of cases and operations as does ether. Yet because of its irritating effect on body tissues and detrimental after-effects, it is undesirable in the majority of cases. Cotton or ethyl ether which undoubtedly gives a greater degree of analgesia and less narcosis, avoids much of the toxic factor and bids fair to make ether the anesthetic of choice in more cases of this group. Through the courtesy of Dr. Cotton I have been able to use this ether in quite a few cases and find it most satisfactory.

Chloroform falls before the weight of popular opinion and after some unpleasant personal experience I can say that its use is not justified except when other anesthetics are not available. Ethylchlorid which is strongly upheld by Ware (American Journal of Surgery, Vol. XXXIV, No. 71) who estimates its mortality at about one to eight thousand, has been recently given popularity during the war. It is well taken by this group of patients in short operations leaving no unpleasant or detrimental effects.

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Obstetrical cases may be included in this group of patients. They are particularly well adapted to nitrous oxid and oxygen by the fact that you have to deal with a series of intermittant physiological pains, caused by muscular contraction, which pain must be relieved without interfering with their cause. In one hundred closely observed cases, I marked only 4 per cent. unsatisfactory. This was caused mostly by the patient being nervous and not allowing the mask to be properly applied. The mother mortality was nil while the baby mortality was 1 per cent., which was due to the unusually hard labor and high applications of forcups. There was no increase in infant cyanosis, in fact the color was better than normal as straight oxygen was given before the cord was tied. Infant jaundice which occurs under chloroform deliveries in from 25 to 30 per cent. was reduced to about 12 per cent.

GROUP B.

Quite a number of our patients fall for this large but neglected group. These are the patients who are either running on their alkaline reserve (compensated acidosis) or those who have used up that reserve and are unable to neutralize the acids produced, causing symptoms which may range from a foul breath to coma. Stanley Reimann estimates this class comprises fifteen or twenty per cent. of the patients showing insufficient alkali.

Every case of uncompensated acidosis is a potential shock case. To add any general anesthetic to the already acid-burdened body is to further invite shock and distressing post-operative conditions. These are the patients who go into shock easily, have a stormy recovery from their anesthetic and who may die several days later with the blame on the operation and not on the anesthetic. Old prostatic cases, severe infections, intestinal obstructions and eclamptics are usually found in this group. Chloroform is emphatically contraindicated. Ether as is shown by Reimann (American Journal of Surgery, Vol. XXXIII, No. 7, July, 1919) also Morriss (Journal of American Medical Association, Vol. LXVII, No. 19) produces a marked acidosis when given for any length of time at an ether tension sufficient to produce surgical anesthesia. Nitrous oxid also produces an increase in the body acid but not to the same degree. Local anesthesia is here the anesthetic of choice when possible. Or when used in combination with nitrous oxid preceded by morphin and atrophin.

GROUP C.

Group three, or shock cases, are frequently met with and cause no little anxiety. They are the cases that come to the operating table with shock or go into shock during the operation. Whether the cause of shock is nerve exhaustion, dilated splanchnic vessels, fat embolism, or acapnia, the symptoms are all the same and may be reproduced by deep etherization. Nowhere is it so necessary for the anesthetist to exercise such watchfulness and careful judgment as in this group. The best treatment for shock is prevention of shock or early recognition of shock and the anesthetist is in the best position to detect it in its incipiency and warn the operator of approaching danger. Cases in shock or those we suspect will go into shock, should always have a prophylatic dose of morphin and atrophin. Personally I make it a routine in all operative cases, except in nose and throat, children and very old people to give from one-eighth to one-fourth grain of morphin with one-hundredth to a hundred and fiftieth grain of atrophin or scopolamin. It minimizes the preoperative psychic disturbance, lessens or eliminates the excitement period of induction, prevents further nerve exhaustion and decreases the amount of general anesthetic necessary. Crile, in his extensive work, has proven the value of prophylaxis against shock, and where possible the technic of nerve blocking, and gas-oxygen anesthesia should be used. In these cases ether may be used to advantage in combination with the gas-oxygen in small stimulative doses. Spinal anesthesia, while it blocks sensory impulses, causes a lowering of blood pressure and defeats the purpose for which it is given in this group of cases.

GROUP D.

Patients with impaired vital organs must be handled with extreme care. Valvular heart lesions do not cause great anxiety if there is a compensation, unless there is unusually severe strain placed upon them during the operation. These patients general are running on their cardiac reserve force and any procedure which causes undue cardiac strain will produce undesirable results. The best index to cardiac risk is the patient's ability to stand physical exertion. (Willius, American Journal of Surgery, Vol. XXII, No. 10, Oct., 1918). Of the valvular lesions mitral stenosis is probably the most dangerous and any anesthetic to these patients is a grave risk. In the past year I have anesthetized four patients with very marked mitral stenosis. One of these, a short curretage, died twenty-four hours later from cardiac exhaustion and two others had a very stormy recovery and long convalescence. Needless to say these patients should be given the anesthetic which will produce a smooth induction and relieve all possible cardiac strain.

Patient with impaired kidney function should not be given ether or chloroform. Grondal estimates that there is a transient albuminuria in about thirty per cent. of operative cases under ether. Carl R. Ruddell (American Journal of Surgery, Vol. XXXV) makes about the same estimate. To just what extent these changes are permanent is not exactly known, but we do know that a kidney damaged and working at full capacity is not benefited by any agent which will cause a healthy kidney to show marked evidence of irritation. Local anesthesia or gas, therefore would be the anesthetic of choice. Spinal anesthesia is also well taken by these cases, provided, it is below the waist and is not accompanied by a high grade arterio-sclerosis or myocarditis. Where a general anesthetic is necessary gas-oxygen should be used.

Operative patients with respiratory diseases always cause us more or less worry. Our main object should be to avoid any further irritation.

During anesthesia further irritation may occur in two ways, either by the anesthetic itself or mucous secretions, or vomitus inhaled during the period when the patients natural reflexts are unable to exclude irritating material. This complication I saw arise frequently in France where the wounded soldier had also been gassed. Ether and chloroform were the only two ansthetics available. Chloroform being the less irritative of the two, was selected, but even then many fatal postoperative broncho-pneumonias occurred.

The acute pulmonary cases are most to be avoided. The chronics do not usually suffer much from short ether anesthesia. However, there is always danger of lighting up old processes that are at the time lying dormant. These patients should always have a preoperative dose of morphin and atrophin followed by a gas-oxygen anesthesia. Rectal anesthesia may also be used to good advantage as its elimination through the lung is not of sufficient concentration to cause serious irritation.

SECOND—THE NATURE AND LOCATION OF THE OPERATION.

The nature and location of the operation frequently relieves us of the responsibility of making a choice of the anesthetic that the patient shall be given.

Nitrous oxid is excluded in many cases because of the inability to obtain proper relaxation, inability to apply an air tight face or nose mask. The first condition is usually found in alcoholics, or heavy muscular men when the operation is high up in the abdomen. Here again liberal doses of morphin and scopolamin greatly facilitate matters. The second include operations about the face and mouth which interfere with the approximation of mask to face. Tonsil operations can be successfully done under gas if the operator is fast and no serious hemorrhage occurs. However the shortness of these operations as a rule do not detain the patient under ether long enough to produce any permanent damage and postoperative nausea and vomiting are the only ill effects experienced. So that in the majority of these cases ether is the anesthetic of choice. In any gas-oxygen anesthesia, the face or at least the ears of the patient should be exposed to view. In cases in which it is necessary to cover the face entirely with sterile drapings, ether should be given by intrapharyngeal, intratracheal, or open drip with the anesthetometer as this allows the anesthetist to remain away from the sterile field with less danger to the patient. Rectal anesthesia is applied here successfully, especially, in goiter cases or resection of glands about the neck.

THIRD—THE OPERATOR.

Last but not least the surgeon must be considered in selecting the anesthetic for the patient, his technic, his skill, his regard for the safety and comfort of his patient, must be known and acted on accordingly. As a rule, the surgeon realizes that the anesthetist is in the best position to know which mode of anesthesia is best for the patient, and to know just what condition that patient is in during the operation. It is a regretable fact, however, that there are still some surgeons who either for the sake of financial gain or personal conveniences will jeopardize the life and comfort of the patient intrusted to them, by using nurses or untrained physicians, thus bringing discredit upon their own profession by avoidable bad results.

The surgeon who wastes time by unnecessary conversation at the operating table, who tugs and pulls unnecessarily on abdominal vicera, and large nerve trunks, who handles all tissues roughly, disregards the anesthetist's warning of approaching danger, will always have bad post-operative results no matter what anesthetic is used. Cooperation is the keynote of success for the surgeon, as well as for the anesthetist. If by success we mean the safety and comfort of the patient. In the past ten years, both surgeon and anesthetist have begun to realize this more and more, with the result that team work has become a great feature in lowering operative mortality, and as any patient will tell you, who was operated on before that time, in adding to the personal comfort of the patient.

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RESULTS OF ETHER ANESTHESIA ON SUSPECTED AND MANIFEST CASES OF PULMONARY TUBERCULOSIS*.

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The present title of my talk may appear rather out of date, since we all remember that any general anesthesia applied to a tuberculous individual may mean a dangerous procedure which though necessary in the performance of operations does not, eliminate certain risks of reactivation of old, more or less dormant foci of tuberculous disease. So I must ask for your attention in bringing the discussion again upon the advisability and contraindications of ether anesthesia.

We all are acquainted with the almost miraculous results of a laparotomy in tuberculous peritonitis where the simple opening of the abdominal cavity, the short exposure of the abdominal organs to the air is followed by regress of the pathological symptoms. Many colleagues have been asking for the explanation for such a change, various explanations have been given, one of them being that the ether anesthesia must be responsible for the good results. Practical experimentation has led the originator of the closed cone ether method or as we may call it "the Savage treatment"[1] to the belief that ether anesthesia is a therapeutic if not a curative agent for tuberculous peritonitis, pleurisy with effusion and for more or less incipient cases of pulmonary tuberculosis.

Such claims necessarily demanded a closer investigation which was carried out at our institution and the results have already been published[2]. Since then, more data were secured which are partly contained in the present review, partly in the experimental work of our faithful colleague, Dr. J. B. Rogers, in charge of the Percy Shields Research Laboratory connected with our institution.

QUESTIONS TO BE ANSWERED.

In the study of tuberculosis particularily the pulmonary form we may answer the following questions:

1. Is there any improvement in the clinical symptoms?
2. Is there any change in the extent and intensity of the morbid pathological process?
3. Are there any dangers to be anticipated from the administration of ether in tuberculous patients?
4. Which are the effects of ether upon the function of different organs and the composition of certain body fluids, including the blood?
5. What is the action of ether and other similar products upon the tubercle bacillus?
6. Practical hints about anesthesia applied to cases of incipient or advanced closed or open cases of tuberculosis.

IMPROVEMENT OF CLINICAL SYMPTOMS.

As expressed in Dr. Savage's communications an improvement of appetite, of cough and expectoration, a change can be noticed. In our opinion this improvement is only temporary, lasting from a few days to perhaps a week. A gain in weight may be noticed in favorable instances, but need not be the rule. In advanced cases the improvement is hardly noticed or is absent and with increased temperature supervening in our impression a greater outspread of the disease must be anticipated. We must observe great caution in deciding whether or not incipient cases of pulmonary tuberculosis improve because they were given ether at one time or whether other beneficial factors were at work to lead to an arrest of symptoms and signs, suggestive of the disease. In my personal opinion, and supported by a careful study of our case histories, I am convinced that in a great percentage of cases the onset of active signs of tuberculosis are closely related to a tonsillectomy, appendectomy or even a lesser intervention suggested by the surgical confrère.

PATHOLOGICAL CASES.

The second question dealing with ether anesthesia producing a *change in the extent and intensity of the tuberculous lesion* we are justified by our pathological specimens and postmortem studies to answer negatively. Diffuse peritonitis, milliary tubercles scattered over the peritoneal lining of the abdominal organs, milliary fresh tubercles in the form of single tubercles, or in form of caseating tuberculous lobar and bronchopneumonic foci point very strongly towards a more extensive dissemination, which may easily occur during the stage of complete relaxation so favoring the aspiration of infective material into formerly healthy areas. Such findings are suggested by the hectic type of temperature, the more extensive signs of pulmonary involvement noticeable by physical examination. Animal experiments would emphasize such a possibility of greater susceptibility of pulmonary parenchyma towards tubercular infection and a greater possibility towards necrosis. Petroffs[3] experiments on Guinea pigs infected with experimental tuberculosis and subjected to ether treatment have revealed no therapeutic influence whatsoever, on the contrary a harmtul and more destructive action by ether upon the pathological process is very plausible.

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*Read before the Section on Physio-Pathology of the Interstate Association of Anesthetists, during the Fifth Annual Meeting, at Cincinnati, September 15-17, 1919.

INCONVENIENCES AND DANGERS.

The third question deals with the inconveniences and dangers of general anesthesia or the subcutaneous introduction of ether. I would think the method of administration is of greater importance in determining to what extent a general anesthesia may become harmful to a case of incipient pulmonary tuberculosis, but the comparison of a carefully made physical examination before and after anesthesia will give the answer. Much discussion can be raised about the reliability of a physical chest examination depending so much upon the personal training of the doctor ordering or performing a surgical intervention, in the difficult recognition and interpretation of physical signs of pulmonary activity. In our daily experience we notice on cases sent to our institution from the outside what great disparity of opinion prevails in the recognition of chest findings, making a due allowance to these chest and lung lesions which are only tracked by stereoscopic lung pictures and which need not be associated with physical signs carefully looked for but not ellicited by the lung specialist. If it is only decent to expect, that before any general anesthesia is made, a careful chest examination has been performed, it is deplorable that operations are done on individuals without any examination of their chest organs being made. It is pathetic to see that shortly after even the operation of a rectal fistula, of hemmorhoids, that such cases are unable to recover and that the pulmonary tuberculosis started from the very moment of such surgical interventions and assuming a rapid fatal course within from three to six months. To cite special instances of this kind is not the purpose of this paper but from the many histories collected at our institution we can easily furnish such data. At this time I would like to bring before your eyes the warning sign of the railroad crossing, "STOP, LOOK, LISTEN!" and would add to it the important word REASON before embarking on a surgical intervention requiring a general anesthesia. The old recommendation of NIL NOCERE, still holds good and in the young generation of graduate doctors, untempered enthusiasm for the knife leads them to radical interventions, which, later based upon more ripened experience, would not meet general approval. Particularily deep anesthesia with the prolonged relaxation, the greater possibility of aspiration of tracheal and bronchial content into deeper portions of pulmonary parenchyma means a serious danger particularly for a manifest tuberculous case.

Aside from the greater extent of pulmonary manifestations clinically and physically noticeable, in my impression several fatal hemmorhages from the lungs seemed to be a factor worthy of consideration, as such complications need even not follow in close succession the anesthesia, but may be associated with the chemical and physical effects of ether upon the blood and cell plasma.

ETHER AND BODILY CHANGES.

We all are more or less familiar with the chemical and pharmacodynamic effects of ether upon the living body. It hardly seems justified to include a few remarks along that line. Investigations on the effect of ether upon metabolism have directed our attention towards the possible onset of acidosis during and after an ether anesthesia, and considering the changes resulting in the liver from the administration of chloroform (Davis and Whipple)[4], it would be desirable that similar studies would be made in the results of ether upon the parenchymatous and degenerative changes in the liver cells and other organs. Yamagava's[5] contributions establishing the lymphagogue effect of ether, resulting in a better drainage of the often clogged lymphchannels, this may constitute either a desirable or undesirable event. In a tuberculous individual it may favor the outspread and dissemination of infective material or toxic products and so must be looked upon as undesirable.

In our observations special attention was paid to the changes in the blood picture of ether cases treated for tuberculosis of the lungs. The total blood count, differential count and the study of the Arneth count suggested the facts that an initial rise in the total number of white cells is noticeable, with an increase in the lymphocytes, but such changes are of a short duration and with every successive etherization even by increasing the dose of the drug and the duration of the anesthesia, the response is less marked, finally subsiding altogether. Not only by such a procedure do we drain the natural means of resistance, but finally we hasten the decline in defence, permitting a more successful invasion of the tubercle bacillus. My friend, Dr. Rogers, as the next speaker on the program, will show in his work that the blood changes in animals become less and less pronounced by a repetition of the ether anesthesia. In giving these facts, we feel that we are yet unable to explain all the effects of ether upon the human organism, a great deal more research work will be required. In this review only larger doses of ether were considered, whilst in the administration of smaller quantities the effects may be less injurious, we must believe the testimony of other investigators—Saliba[6], Hamburger[7]—that ether may in small doses have a bactericidal effect and a stimulating action upon the repair of injured tissue cells.

EFFECT OF ETHER ON THE TUBERCLE BACILLUS.

As regards the fifth question, the action of ether upon the tubercle bacillus investigations carried out by various authors[8] and myself[9], have lead to the possibility of a partial extraction of the fatty constitutents of the tubercle bacillus. It is not impossible that a more or less similar process takes place in a tuberculous focus. Experience has shown that these partial antigens are quite powerful and minute quantities injected subcutaneously are suffi- focal reaction. It appears undesirable that in a general anesthesia we have no measure at all to dose these evidently toxic substances and the undesirable after effects of anesthesia may be partly linked to the liberation of an unmeasured amount of similar toxins. This point in my opinion deserves our attention and constitutes one element of objection for undiscriminate application of ether in a tuberculous individual.

Finally before closing my paper on the subject, it may seem that in enumerating the dangers and inconveniences of ether application in this class of patients designed as suspect and manifest cases of pulmonary tuberculosis, I would discard the use of ether entirely. I am well aware that there are certain cases in which we cannot get along without the use of ether. On the other hand, however, I would urge that no ether nor chloroform[10] anesthesia be given without any proceeding reliable chest examination being made and that if ever possible the anesthesia be cut short as much as possible. The administration of an anesthetic has developed into such an art, that I am sure that the specialist will adopt a clever method of removing and lessening pain without adding an undesirable injury to the patient's existence by allowing a dormant tuberculous focus to become active again so undermining the results of a skillful surgeon. Internal Medicine, the Art of Anesthesia and Surgery can and must work together in harmony and realize that great aim of our profession to prevent disease, erradicate suffering and preserve the sublime gift of human health and happiness.

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[10] Olivares: Ed. Revista Medica.

THE EFFECT OF ETHER ANESTHESIA AND SUBCUTANEOUS INJECTIONS OF ETHER ON THE CIRCULATING LEUCOCYTES.*

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Even in the considerable work that has been done to determine the effect of ether on the circulating leucocytes, the results obtained by different workers are not uniform. The majority of them have estimated the leucocytes before and after surgical procedures and it is difficult to draw the line between the effect of the operation and the anesthetic.

Chadborne estimated the number of white cells before and after the operations in twenty patients that had some degree of leucocytosis, and found an average increase of 37 per cent.

Cabot, Blake and Hubbard studied fifty patients before and after operation, 86 per cent. of whom showed an increase and 14 per cent. a decrease.

Ewing states that ether anesthesia will usually increase the leucocytes about 2,000. In an experimental study of three rabbits, he found no difference in the leucocytes before and after full anesthesia.

Da Costa and Kalteyer, in a study of fifty cases before and after operation, using ether anesthesia, found an average increase of 4,856 cells.

Frasier and Halloway made a study of forty cases suffering from malignant tumors (inflammatory cases, also non-inflammatory) and in each case found a marked increase, the minimum being 9,000 and the maximum 20,000 cells.

The difficulty of arriving at a conclusion of the results of ether anesthesia before and after operation is very apparent. In such conditions not only the injuries to the tissues, but loss of blood, evacuation of pus cavities and vasomotor influences and so on may be entirely responsible for any change in the cell variation before and after anesthesia.

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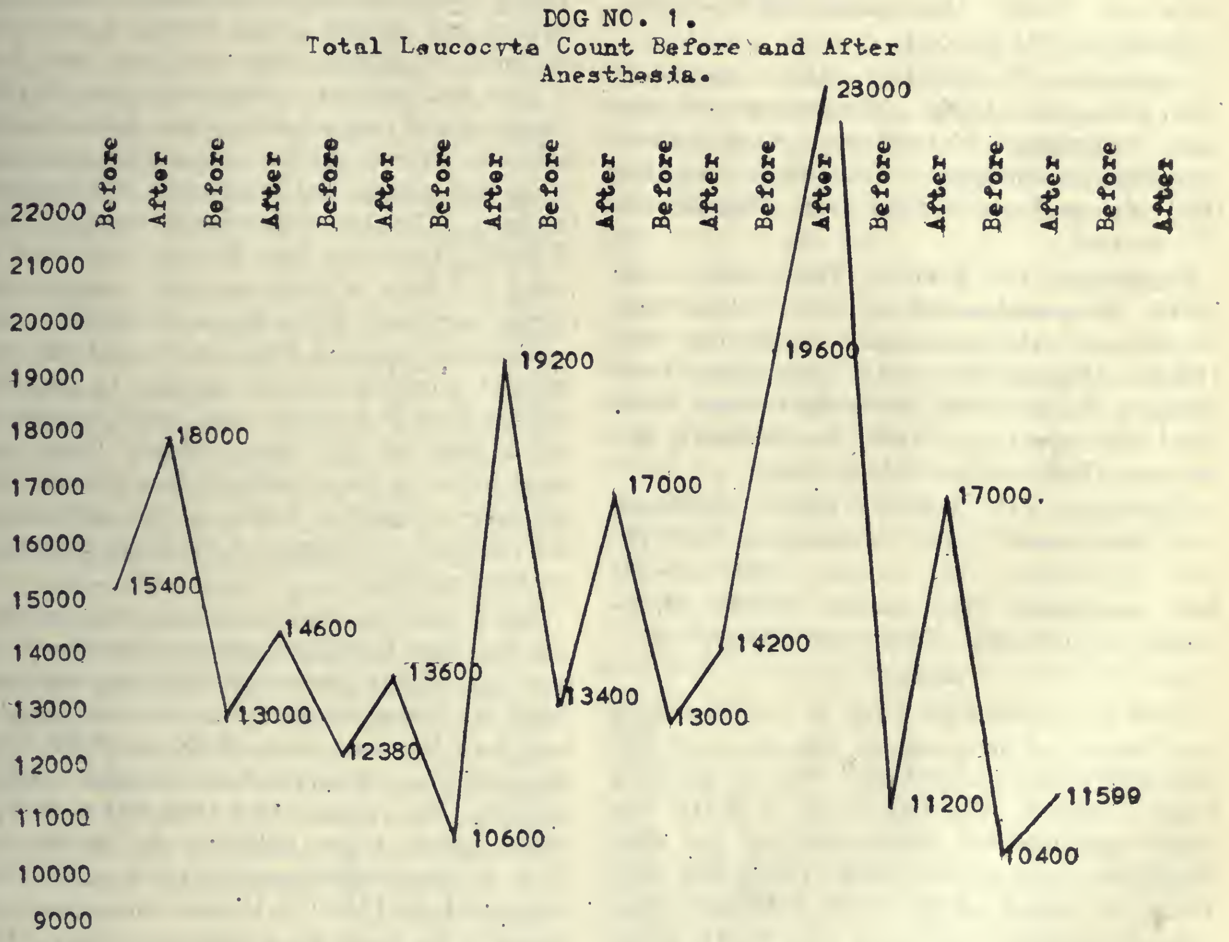
*Read before the Section on Physio-Pathology of the Interstate Association of Anesthetists, during the Fifth Annual Meeting, at Cincinnati, September 15-17, 1919. From the Percy Shields Laboratory, Cincinnati; Tuberculosis Sanatarium, University of Cincinnati.

PERSONAL STUDIES IN LEUCOCYTOSIS.

Having for several years been interested in the leucocytes both in health and diseased conditions, we are now extending the work on to investigations relative to the leucocytic changes brought about by chemicals, experimental infections, bacterial toxins, and non-bacterial protogenous substances. Our attention was directed to the employment of ether by Dr. Zueblin at the Cincinnati Tuberculosis Sanatorium, who used it as a therapeutic measure. This present paper is in itself only the experimental stage of the work. Those who practice in the field of Hemotology are familiar with the many factors that greatly influence the blood changes both in the individual and the animal, also numerous technical factors. To be brief, uniform results are hard to obtain with our present system of counting.



The work herein reported consists of fifty-three complete white cell and differential counts, forty-five of which were made on five dogs and eight on four rabbits. The Arneth nuclear classification was carried out on dogs 2, 3, and 4. This classification consists of separating the polymorphonuclear cells into five different classes according to the number of fragments composing the nucleus. The index is obtained by adding all of classes one and two and one-half of class three.

The normal index is 55 to 60; in bacterial infections and intoxication it may reach 90 to 95. We have found this index to correspond closely to the total white cell or polynuclear increase. The slides being fixed in alcohol and stained with hemotoxylin and eosin are suitable for both differential and Arneth counts.

EXPERIMENTAL RESULTS.

Experiment I, Dog I. 8-5-18. Leucocyte count before ether anesthesia 15,400. Mononuclears 44.5 per cent. Polynuclear 55.5 per cent. One-half hour after anesthesia, leucocytes 18,000. Mononuclears 48 per cent. Polynuclears 52 per cent.

Experiment II. 8-6-18. Before ether. Total white count, 13,000. Mononuclears 38.5 per cent. Polynuclears, 61.5 per cent. After one-half hour anesthesia. Total white cells, 14,600. Mononuclears, 37 per cent. Polynuclears, 63 per cent.

Experiment III. 8-7-18. Before ether. Total white count, 12,380. Mononuclears, 46.5 per cent. Polynuclears, 53.5 per cent. After one-half hour anesthesia. Total white cells, 13,600. Mononuclears, 53.5 per cent. Polynuclears, 46.5 per cent.

Experiment IV. 8-8-18. Total white cells, 10,600. Mononuclears, 32 per cent. Polynuclears, 68 per cent. After one-half hour anesthesia. Total white cells, 19,200. Mononuclears, 41.5 per cent. Polynuclears, 58.5 per cent.

Experiment V. 8-15-18. Before anesthesia. Total white count, 13,400. Mononuclears, 43.5 per cent. Polynuclears, 56.5 per cent. After one-half hour complete anesthesia. Total white count, 17,000. Mononuclears, 32.5 per cent. Polynuclears, 67.5 per cent.

Experiment VI. 8-16-19. Total white cells, 13,000. Mononuclears, 37 per cent. Polynuclears, 63 per cent. After anesthesia. Total white cells, 14,200. Mononuclears, 34.5 per cent. Polynuclears, 65.5 per cent. Forty-eight hours later. Total white count was 19,600. Mononuclears, 52.5 per cent. Polynuclears, 47.5 per cent.

Experiment VII. 8-20-18. Before anesthesia. Total white count, 11,200. Mononuclears, 43.5 per cent. Polynuclears, 56.5 per cent. After one-half hour anesthesia. White count, 17,000. Mononuclears, 56 per cent. Polynuclears, 44 per cent.

RESULTS.

From the experiments it can be seen that there is an increase of the leucocytes following each one-half hour complete anesthesia. This is shown in Chart I, Dog I. The high count of 28,000 was found following the sixth anesthesia and after feeding the dog a large quantity of uncooked meat. Taking an average of the white cell counts before anesthesia we have total white cells 12,711, mononuclears 38.8 per cent. and polynuclears 61.2 per cent. One-half hour after, an average of 16,085 white cells, mononuclears 40 and polynuclears 60 per cent.

Dog 2. Two complete anesthesias were given, the first being followed in twenty-four hours by the second and counts taken five hours after each anesthetic. The total white cells were increased from 15,000 to 16,400 each time. The percentage of the mono and polynuclears showed a difference of only 1 per cent., which can easily be a technical error. Sixteen hours after the last anesthesia, the total white count had risen to 17,600 and the polynuclears had increased 7 per cent. with a corresponding decrease in the mononuclears. Two days after the last anesthesia, 5 cc. of ether was injected each day subcutaneously for three successive days and counts taken each day show the following white counts, 16,800, 15.500 and 16,000 respectively. The polynuclears, mononuclears and Arneth counts remained practically the same.

Dog 3 was given two complete anesthesias on successive days. The total white cells increased from 9,000 to 11,400 after the first anesthesia and decreased 8,000 cells after the second. The mononuclears and Arneth counts remained practically the same. Beginning twenty-four hours later, 5 cc. of ether was injected subcutaneously two days in succession and counts taken sixteen hours later in each case. The total white cells and the percentage of the mononuclear and polynuclear cells remained the same. The Arneth Index was increased from 57 to 67. Four days later 20 cc. of ether was injected two days in succession and counts taken twenty-four hours following each injection. The total whites increased from 7,600 to 11,000 after the first injection with an increase in the polynuclears from 58 to 63 per cent., and a corresponding decrease of the mononuclears. Forty-eight hours following the second injection the total cells had again dropped to 9,200, but the polynuclears had reached a percentage of 69 at the expense of the mononuclears.

Dog 4 was given two anesthetics followed fourteen days later by two subcutaneous injections. Before and seventy-four hours following the anesthesia, the leucocytes were estimated and found to have been increased from 12,200 to 17,000. The mononuclears and polynuclears changed only 1.5 per cent. The Arneth Index from 58.5 to 69.5 per cent. Sixteen hours following the injection of 10 cc. of ether subcutaneously, the leucocytes had increased from 12,000 to 14,000 with no particular change in the mononuclears and polynuclears. Five cc. was then injected subcutaneously and the leucocytes estimated twenty-four, forty-eight and sixty-two hours later, showing total counts of 13,000, 14,600 and 15,000 respectively, with no particular change in the differential count.

Four full-grown rabbits were given complete ether anesthesia and the total white cells and differential counts made just before and one-half hour after anesthesia. The average counts obtained were as follows: Before. Total white cells, 11,875. Mononuclears, 46 per cent., and polynuclears, 54 per cent. After anesthesia. Total white cells, 11,750. Mononuclears, 37 per cent., and polynuclears, 53 per cent.

SOME ADJUNCTS WHICH PROMOTE EFFICIENCY IN THE USE OF LOCAL ANESTHESIA IN MAJOR SURGERY.*

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Notwithstanding the boon that the discovery of general anesthesia has been to surgery, chloroform, ether, and gas have so many shortcomings and dangers, both immediate and remote, and their use is accompanied by so much discomfort to the patient, that it is no wonder local anesthesia is gradually gaining in popularity. In considering the anesthesia problem the fact is patent that the ideal method has not yet been developed. The virtues of any anesthetic are purely relative.

All general anesthetics produce their toxic effects almost directly in proportion to the amount used, and to a large extent the quantity used depends upon the length of time the patient is under their influence. While this point is not of special importance in a large percentage of cases, there still remains a fairly large class in which it is of the utmost importance, a fact which, I think is not sufficiently appreciated. It is a difficult point to decide in a given case just what part a heavy dose of a general anesthetic has played in the event of an untoward result following a major surgical procedure.

The future will develop a great improvement upon the present method of producing surgical anesthesia, and local anesthesia is making marked encroachment upon the field. My personal viewpoint has changed from year to year, increasing experience having invariably *broadened* the scope of local anesthesia and *decreased* the field where general anesthesia was believed necessary. In this, with few exceptions, my experience has not varied from that of others who have used local anesthesia in a fair percentage of their work. Increasing experience has made it possible for me to perform with satisfaction operations which I formerly believed to belong solely in the field of general anesthesia. Little difficulties have gradually been overcome by methods devised to meet them, with the result that I have been compelled repeatedly to modify my attitude on this subject.

FACTORS IN THE SCOPE OF LOCAL ANESTHESIA.

It is with a discussion of the possible scope of local anesthesia and some of the methods which facilitate its use that this paper will concern itself.

The scope of local anesthesia will depend largely upon the surgeon's attitude, which in turn is a fair index of his ability to use the method. The personal equation enters so largely into a consideration of the problem that one can give only his own experience and impressions.

We have arranged our cases into the five following classes:

First—Ideal.
Second—Satisfactory.
Third—Unsatisfactory.
Fourth—Failures.
Fifth—Mixed cases.

First Class.—In this class we have included only those cases in which the operation was completed without complaint on the part of the patient, and in which, in my judgment, the anesthesia established permitted the performance of the operation as satisfactorily as could have been done under any other form of anesthesia.

Second Class.—In this class we have placed operations in which the anesthesia was good, but in which the patient at times complained or suffered some inconvenience, although, in my judgment, the patient was not caused appreciable pain, he failed to go through the operation without complaint. No patient was placed in this class unless the operation was performed with as great or greater satisfaction than would have been the case with any anesthetic familiar to me.

Third Class.—Here we have placed cases in which the operation was completed under local anesthesia, but in which for some reason we would consider some other form of anesthesia more desirable.

Fourth Class.—In this class we placed those cases in which it was necessary to resort to general anesthesia in order to complete the operation, either because the patient complained of pain or because general anesthesia was necessary in order to carry out some part of the operative procedure.

Fifth Class.—In this class we placed the cases in which the use of general anesthesia had been anticipated or planned and only a certain portion of the operation was to be carried out under local anesthesia.

The record of the last six hundred major operations which I have performed serves as a fair index of my attitude at present regarding the scope of local anesthesia.

REPORT OF LAST SIX HUNDRED CASES.

		Per Cent.
Number begun under general anesthesia	49	.817
Number begun under local anesthesia	551	.919

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*Read during the Fifth Annual Meeting of the Interstate Association of Anesthetists, before a Joint Session with the American Association of Obstetricians and Gynecologists, at Cincinnati, September 15-17, 1919.

Cases falling in Class One (Ideal)	383	.695
Cases falling in Class Two (Satisfactory)	114	.208
Cases falling in Class Three (Unsatisfactory)	36	.065
Cases falling in Class Four (Failures)	7	.012
Cases falling in Class Five (Mixed anesthesia)	11	

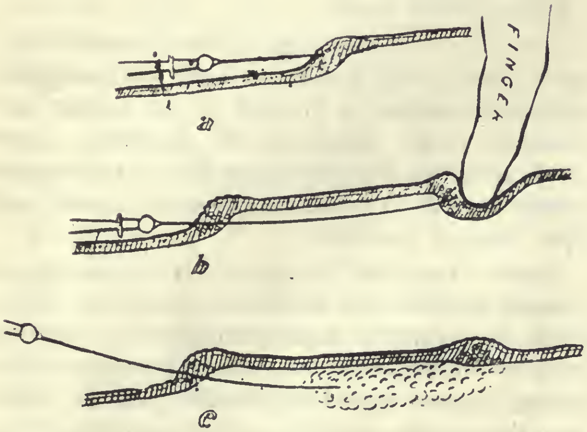

Fig. 1—Sectional views of the skin; *a*, method of making first dermal wheal; *b*, painless subcutaneous method of making secondary wheals; *c*, method of making subdermal infiltration.

FACTORS THAT HAVE INFLUENCED THE PERSONAL USE OF LOCAL ANESTHESIA.

Elements which have largely influenced me in the adoption of the present attitude may be enumerated as follows: *First,* a realization that liberal amounts of novocain can be used if properly safeguarded: *Second,* the development of an improved armamentarium: *Third,* the development of a morale on the part of my assistants and the hospital attaches which, together with the gradual education of my clientele, greatly influenced the mental attitude of prospective patients; and *Fourth,* an improvement in the method of handling the tissues.

At the present time all of our operations are begun under local anesthesia with the exception of cases in which it would be obviously impossible to handle the condition by this method. As may be seen by the above table, this amounts to approximately seven per cent. and is confined largely to work about the face and mouth in children and to adults who refuse the method.

VALUE OF COMPLETE AND DISADVANTAGES OF INCOMPLETE LOCAL ANESTHESIA.

While local anesthesia has many shortcomings, because certain operative procedures cannot be carried out under its use and certain patients will not submit to it, it is my belief that faulty technic is responsible for the vast majority of failures. Take, for example, a simple laparotomy for the removal of the appendix and shortening of the round ligaments, a perfect local anesthesia will allow us to complete this operation without touching the viscera within the pelvis except where it is necessary to attack the round ligaments and cecum. No gauze is necessary for packing off intestines and all pelvic viscera may be examined as at autopsy. On the other hand, an incomplete local anesthesia on the same kind of a case will give an entirely different picture. The patient who is repeatedly hurt during the injection, or perhaps has an incomplete infiltration, leaving sensitive areas in the field of operation, will develop in the abdominal wall reflexes over which he has no control, and which will cause the forcible extrusion of the intestines through the wound as soon as the incision is made. In order to retain the intestines within the abdominal cavity in such a case pressure by gauze pads is necessary. This in turn produces more pain which increases the combative action on the part of the abdominal muscles. We have here a *vicious circle,* which spells failure for the method in practically every case. The individual who blames local anesthesia

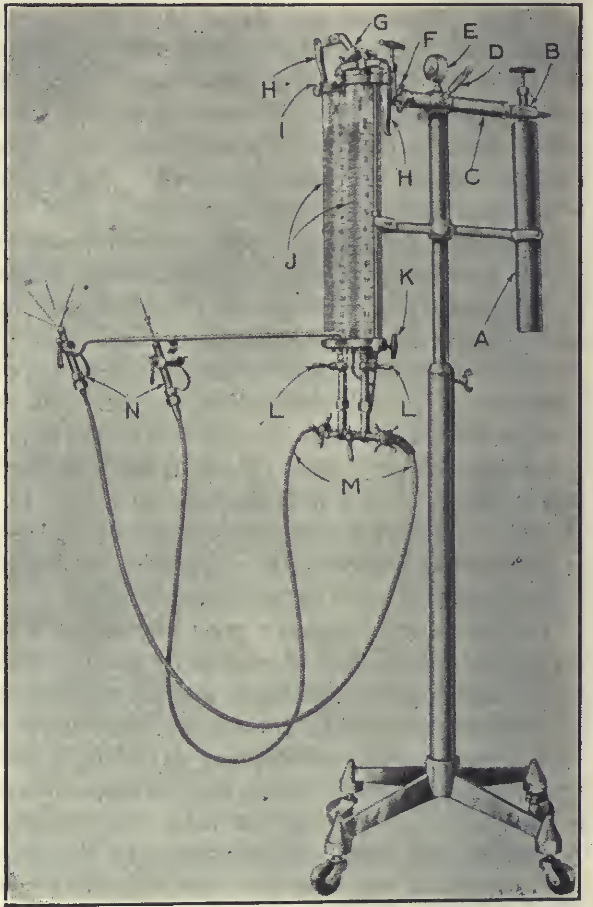

Fig. 2—Pneumatic Injector for use in introducing local anesthesia.

or the mental attitude of the patient for this condition can only be classified in one category by those who know what the actual cause of the trouble is, and yet this is what one usually sees when attempts are made to perform laparotomies by this method.

The ideal sought is a complete abolition of the reflexes of the abdominal wall, with its resultant relaxation, and a negative intra-abdominal pressure like that seen at autopsy. This is accomplished by a perfect anesthetization of the line of incision, painlessly produced, and gentle vertical retraction of the abdominal wall. Exposure of the viscera is facilitated by the use of gravity. The Trendelenburg position and lateral tilting, etc.

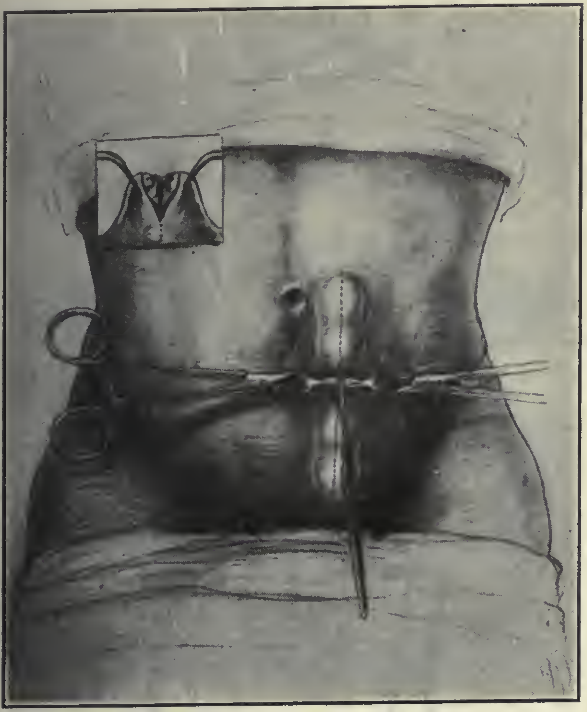

Fig. 3—Towel clips elevating the skin while incision is being made. Insert-end view of same.

POINTS IN TECHNIC.

To my mind the most important point is the careful introduction of the drug, and it is in attention to small details that success is achieved. All of the modern textbooks or articles on local anesthesia advocate the introduction of the needle at two or more sensitive points on the abdominal wall. This entirely unnecessary procedure is apt to upset the patient at the very beginning and to shake his confidence which may not be any too great at best. On the other hand, if the patient is only hurt once, as in making the first dermal wheal, and the future sites for the introduction of the needle are anesthetized from beneath (see Fig. 1), the anesthetic may be introduced almost without sensation. Syringes on account of their jerky action and the muscular effort required have been found unsatisfactory for smooth and perfect work. Even the improved syringe which eliminates the necessity of refilling does not give one the opportunity to carefully disseminate the solution into the tissues. The Pneumatic Injector, which we have used for ten years, gives one the greatest opportunity for smooth and painless infiltration of the tissues. (See Fig. 2.)

Once the anesthesia is established, the incision should be made with a sharp instrument, preferably between two towel clips which elevate the skin and prevent pressure upon the abdominal viscera. (See Fig. 3.)

During the making of the incision this elevation should be continued without intermission, and as soon as the peritioneum is opened, all abdominal viscera will drop away from the site of the incision, providing the anesthesia is perfect. (See Fig. 4.) A Trendelenburg position with lateral tilting will expose any organ in the lower abdomen In the upper abdomen the stomach, gall-bladder, duodenum, liver, and colon may be examined visually as well as digitally. The patient can, of his own volition, show the gall-bladder or stomach to the onlookers by an expulsive effort, and by opening the mouth and relaxing, can allow these organs once more to drop back into the abdomen. It is desirable to substitute suction for sponging. Abdominal packs are used only when there is danger of soiling, and then they are to be simply laid upon the viscera, and not forced snugly and with great pressure against serous-coated organs, as is so commonly done where the patient is under general anesthesia.

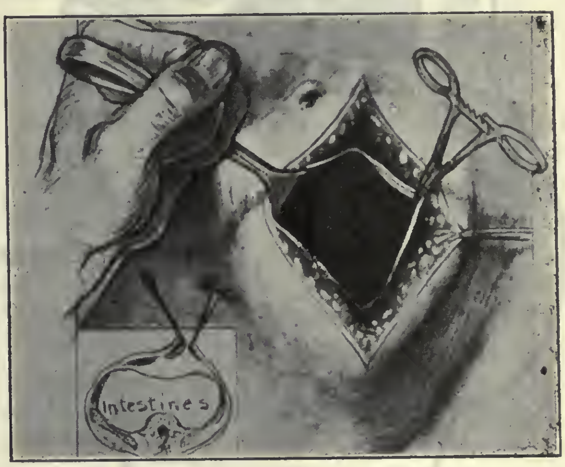

Fig. 4—Vertical retraction of the abdominal wall. Insert-end view of same.

In all of our abdominal work, except in the operation for inguinal hernia, a direct infiltration of the tissues is effected and the complete infiltration of the abdominal wall is made before the incision is begun. (See Fig. 5.) This method is chosen because of its efficiency, simplicity, accuracy, and speed. It is not used in the case of inguinal hernia because the infiltration of the tissues obscures to some extent the anatomical relations.

Visiting surgeons frequently inquire regarding the danger of introducing the needle directly through the abdominal wall and injuring the abdominal viscera. This danger is practically nil as has been proven in thousands of instances in human as well as animal surgery. By advancing the needle slowly and constantly forcing a stream of the solution ahead of the needle point the peritoneum will seldom be penetrated. This point has been proven by using solutions colored with methylene blue.

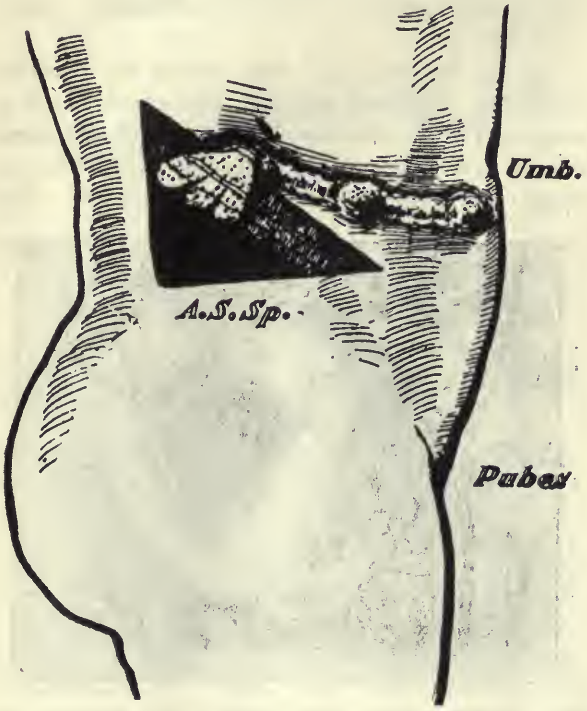

Fig. 5—Section of abdominal area infiltrated.

Once the abdomen is open, vertical retraction, tilting, and careful handling of the tissues are our main strategic points. Sensitive visceral surfaces, such as are found in the round ligaments, the mesoappendix, about the uterine cervix, the ovarian pedicles, and the cystic duct of the gall-bladder may be anesthetized before being attacked. Long, fine needles, mounted upon the ball-and-socket joint of the cut-off as shown in figure 6, should be used where one wishes to make infiltrations deep within the abdomen and the hand does not obscure the view. Suction is substituted for sponging which may cause a disagreeable sensation.

Where traction on the pelvic viscera is anticipated, as in the case of bad infections or malignancy, caudal anesthesia precedes the infiltration of the abdominal wall.

Vicious, forcible retraction is to be condemned. In this work we employ the wire automatic retractor as shown in figure 7. The writer believes that visual examination of the abdominal organs is much more advantageous than digital. Extensive abdominal operations performed under local anesthesia, if done painlessly, usually show a patient with a pulse rate below 80, no sweating, normal respiration, normal color, normal temperature and an unchanged blood pressure at the end of the operation. The elimination of trauma to the abdominal wall and viscera insures almost without exception a smoother convalescence than we have been able to obtain under the use of general anesthesia. My experience leads me to believe that post-operative ileus and gas pains are, in the absence of infection, directly proportionate to the amount of trauma

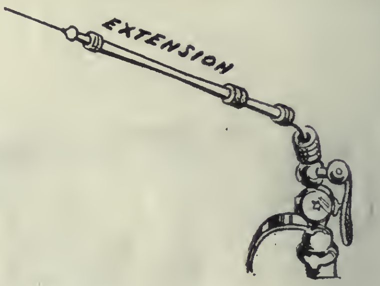

Fig. 6—Shows extension attached to cut-off for use in deep cavities.

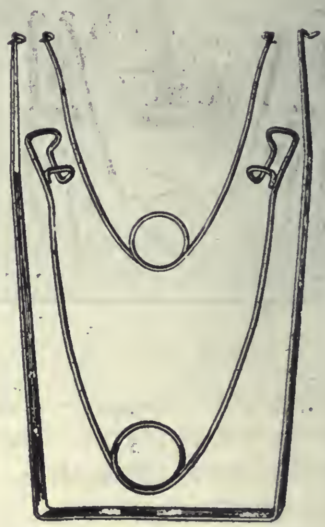
Fig. 7—Automatic wire retractors.

employed during the operation. Nausea and thirst, and vomiting, with its disagreeableness and its sequels of wound strain and pain are largely eliminated.

LOCAL ANESTHESIA IN CHILDREN.

When operating upon children under local anesthesia restraint is necessary while the anesthetic is being introduced. Figure 8 shows a simple manner in which this restrain may be employed without in any way interfering with the technic of the operation. My experience of more than 100 operations performed on children under the age of fifteen shows that the restraint necessary is probably less than ten per cent. of that required during the administration of a general anesthetic and that this class of patients lend themselves exceptionally well to this form of anesthesia.

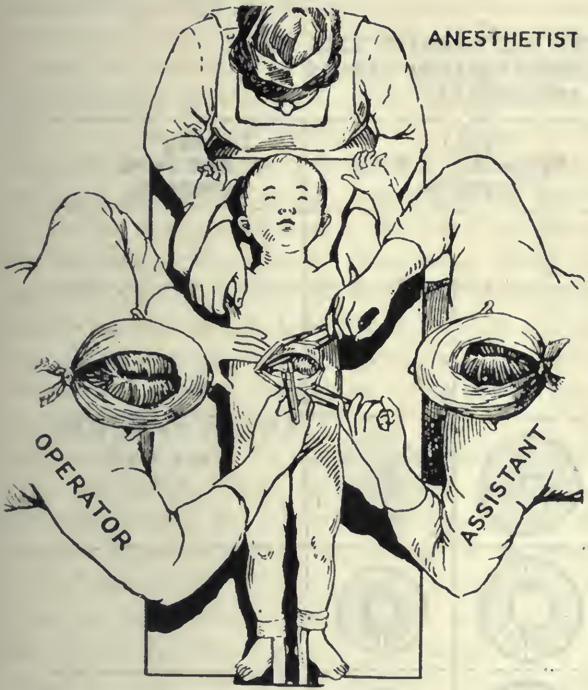

Fig. 8—Illustrating the method of controlling young children in operations under local anesthesia. By making traction on the arms the anesthetist controls the child when necessary.

301 Physicians' and Surgeons' Bldg.

THE INTERSTATE ASSOCIATION OF ANESTHETISTS HAS BEEN ACCORDED THE DISTINCTION OF A JOINT MEETING WITH THE PENNSYLVANIA STATE MEDICAL SOCIETY, AT PITTSBURGH, OCTOBER 4-7. THE PROGRAM FOR THURSDAY AFTERNOON WILL BE DEVOTED TO PAPERS ON ANESTHESIA BEFORE A JOINT SESSION OF ALL THOSE IN ATTENDANCE. IT IS ALSO EXPECTED THAT THE NATIONAL ANESTHESIA RESEARCH SOCIETY WILL MEET AT THE SAME TIME AND PLACE. MAKE YOUR ARRANGEMENTS TO ATTEND. ALL THE ACTIVITIES OF THE MEETING WILL OCCUR IN THE WILLIAM PENN HOTEL.

THIRD STAGE ETHER ANESTHESIA: A SUB-CLASSIFICATION REGARDING THE SIGNIFICANCE OF THE POSITION AND MOVEMENTS OF THE EYEBALL.*

Arthur E. Guedel, M.D.,
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This paper and the accompanying scheme of illustrations was used by the writer many times in teaching anesthesia with the A. E. F. in France.

The objects in presenting this paper are two: *First,* to encourage lighter and more even ether anesthesia; and *second,* to present some tangible form for didactic teaching of anesthesia to students.

Our literature up to date mentions four stages of anesthesia. The first stage, during which the patient experiences analgesia but does not lose consciousness; second, the stage of excitement; third, the surgical stage, and fourth, that stage beginning with cessation of respiration and ending with cardiac paralysis and death.

DEMANDS OF MODERN ANESTHESIA.

Modern anesthesia requires more than this. The knowledge that the patient is in the third or surgical stage is not now sufficient. We should be able to say at any time in just what part of the third stage we are carrying anesthesia. The latitude of third stage anesthesia with ether is great, so great that the patient may easily be given more ether than necessary without being in any immediate danger. Postoperative toxemia is in direct proportion to the amount of ether administered. The patient may be carried lightly with good relaxation and quietude, and suffer but slight postoperative toxemia from the ether, or he may be carried for an hour in the deepest part of the third stage with immediate safety so far as the anesthetic is concerned, but the postoperative toxemia will be great. Light anesthesia, if it be acceptable to the surgeon, is infinitely better than deep anesthesia. We have known this for a long time, but have not known that there is a very light stage of surgical anesthesia which affords the surgeon as much ease and comfort in operating as the state of deepest third stage anesthesia. We have often stumbled onto this stage,—one of quietude and tranquility, but were usually alarmed by the apparent respiratory depression, and by withdrawing all ether, have usually lost it.

Many of our anesthetists, even of today, state that it is necessary to watch only the respiration of the patient in order to determine the degree of anesthesia present. However, our better anesthetists realize that they must take note of every available sign in their work if they are to do it well.

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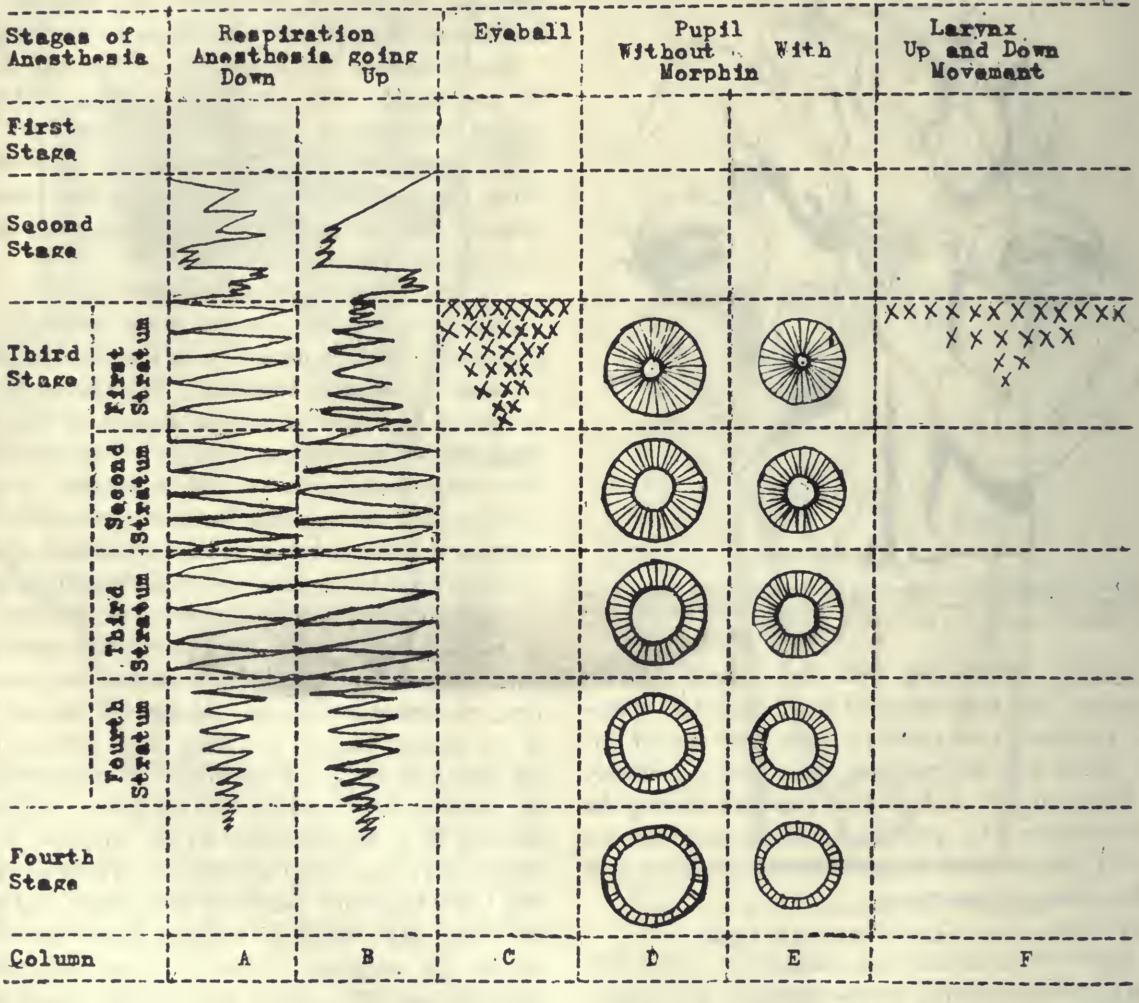
*Read before the Indianapolis Medical Society, April, 1919; the Indiana State Medical Association, at Indianapolis, September, 1919, and the Sixth Annual Meeting of the Interstate Association of Anesthetists, at Cincinnati, September 15-17, 1919.

VALUE OF EYEBALL AND PUPIL.

In my experience, which includes over 10,000 cases conducted personally and by my assistants in France, the eyeball with its position and movements has afforded a sign which, in proper classification, is reliable and cannot be ignored. The oscillation marks the stage of ideal anesthesia after the first ten or fifteen minutes of administration has elapsed.

SCHEMATIC CHART SHOWING THE SIGNIFICANCE OF CERTAIN REFLEXES UNDER VARIOUS STAGES OF ETHER ANESTHESIA.



I have divided third stage ether anesthesia into four strata. The accompanying chart presents a correlation of the various signs found in the different strata of the third stage. Attention is called in this paper only to the third stage, inasmuch as there is nothing new to be said of the first, second and fourth stages. The chart consists of columns A, B, C, D, E and F, and takes into consideration various signs separately and in conjunction with each other.

COLUMN A—SHOWING RESPIRATION WITH ANESTHESIA GOING DOWN.

There is no regularity or rhythm to the respiration of the second, or stage of excitement. From experience we recognize the transition from the second to the third stage, by the inauguration of respiration that is rhythmical and exaggerated. The exaggeration is marked and continues so, almost without change, provided there is a continuance of sufficient ether to carry the anesthesia progressively downward throughout the first, second and third strata of the third stage. However, as the fourth or deepest stratum of this stage is entered, the respiration shows beginning depression. This depression continues progressively downward through the fourth stratum until its complete cessation marks the transition into the fourth stage.

COLUMN B—RESPIRATION WITH ANESTHESIA COMING UP.

After respiration has ceased as the fourth stage is entered, the ether has been removed and respiration started by artificial means, it will begin as it left off, with shallow movements. As the patient unloads his excess of ether coming up, the respirations grow in depth progressively, the rhythm being maintained, until the upper border of the fourth stratum is reached. Here there is an exaggeration corresponding to that in Column A at the same level. As the patient continues to come out, this exaggeration continues as in column A, throughout the third and second strata. As the lower border of the first or upper stratum is reached there occurs the beginning of a quieter respiration. Why respiration should become quiet at this point with anesthesia coming up, I do not know; but it does. It becomes progressively quieter as the first stratum is traversed upward, until at the upper border it apparently almost ceases. This is just before the patient comes out to the coughing or vomiting state. This respiratory state of quietude has often alarmed us and not infrequently has caused the surgeon to pause in his work to inquire the condition of the patient. True, to one who has not been watching closely the progress of the anesthesia, to one who judges the degree of anesthesia by the respiration alone, the finding suddenly of this quiet respiratory stage is apt to be alarming. Under the old rule of "When in doubt, wait!" which by the way is always a good rule to follow, the ether would be removed and the patient soon found vomiting or becoming unquiet. However, there need be no doubt about the degree of anesthesia here. The question to be decided is a simple one. Is the patient just ready to come out, or to go out? In other words, is he in the first stratum of the third stage, or in the fourth stratum. The answer to this lies in the eyeball.

COLUMN C—THE EYEBALL: ITS MOVEMENT OR ITS POSITION.

The eyeball offers one of the most important signs in anesthesia today. *As long as the eyeball is oscillating or is in an eccentric position though stationary, there is no danger that too much ether has been given. Aside from extraneous circumstances, such as positional asphyxia, hemorrhage, or shock, if the eyeball is moving or is stationary but eccentric, the patient is safe and in good condition.*

As the patient enters the first or upper stratum of the third stage, either from above or below, there is manifest a partial paralysis of the motor occuli muscles. Either there will be an intermittent contraction and relaxation, or variations of these, causing a rhythmical oscillation of the eyeball, or there will be a stronger tonic contraction of one set than of another, resulting in a stationary but eccentric globe. Occasionally in the alcoholic, or the individual of high reflex nervous tension, in place of the above there will occur a peculiar slight twitch of the globe, usually in a lateral direction. This twitch may not occur until from three to five seconds after the lid has been raised for inspection, therefore this inspection should not be momentary. When this twitch does occur, whether late or early, it means the same thing as above, namely that there is only a partial and not a complete paralysis of the motor occuli muscles.

Whether there be a rhythmical oscillation, an eccentric stationary globe, or the twitch just mentioned, the meaning is the same: the patient has not had too much anesthetic and, other things being equal, is in an ideal stage of surgical anesthesia.

As seen in the accompanying chart, the motion or eccentricity of the eyeball is greatest at the extreme upper border of the first stratum of the third stage. As anesthesia progresses downward from here this motion or extreme position decreases progressively until the second stratum of the third stage is reached. The transition from the first to the second stratum is marked by the cessation of the eyeball movements, or by the change from *eccentric* stationary to *centric* stationary position of the globe. This is the point at which the paralysis of the motor occuli muscles becomes complete.

With anesthesia going down there is no further movement of the eyeball, no further contraction of any of the motor occuli muscles.

THE PROBLEM OF RAPID INDUCTION.

In hospital anesthesia as it is conducted today, with the hurry to have the patients ready for the waiting surgeon, they are forced under rapidly, either with straight ether or with the nitrous oxid, or ethyl chlorid, or some other ether sequence. They are usually taken to the knife before there has been time to "even them up," or before they have settled down to an even ether saturation. Consequently, at first, there is a deeper degree of anesthesia necessary for quiet relaxation than that indicated by the partial paralysis of the motor occuli muscles. Here it is up to the anesthetist to put the patient, in the beginning, down to the second or even the third stratum, as herein illustrated, but to allow him to come up to the first stratum, that of the oscillating or eccentric eyeball, as soon as possible, *and to maintain him there.*

In this state the patient presents a better operative general condition than in the second or third stratum, because of the quiet respiration. As a rule it is as satisfactory to the surgeon as the fourth or deepest stratum.

In anesthesia with ether, carried for an hour or more, if the eyeball be *kept oscillating* the patient will usually emerge shortly from the anesthetic and there will be less nausea and depression than we have formerly experienced. By watching the eyeball reflex internes are now conducting better anesthesia than before.

If it were always possible to use as much time as one desired in the induction of ether anesthesia, the patient could, in the course of fifteen minutes or so, be carried gradually to this first stratum of the third stage and anesthesia be there maintained throughout the operation. But for some inexplicable reason, in most hospitals, the idea of saving time is to *start* the operation. Its finish may come when it will.

In finishing the consideration of Column C of the accompanying chart, it is important to say that when the respiration is found very quiet and seemingly depressed to a considerable degree, *the eye must be inspected.* If the eyeball is oscillating or eccentric the sage of anesthesia is right and ether should be continued. If the eyeball is *stationary on center* with the pupil dilated, the anesthesia is too deep, and ether should be discontinued at once.

COLUMN D—PUPIL WITHOUT MORPHIN.

Morphin is so universally used as a preanesthetic narcotic, either alone or in combination with other drugs, that this column is of only relative importance. Before the advent of the use of morphin generally for this work we were taught that the pupil may be dilated, but that it must react to light. *Without morphin the pupil, in the average case, does not begin its dilation until the lower part of the second or upper part of the third stratum is reached. Therefore the dilated pupil, even without morphin, is an indication of anesthesia being too deep.*

COLUMN E—PUPIL WITH MORPHIN.

The statement has often been made that when morphin is given in combination with atropin in the usual proportions of 1/4 and 1/150 gr., the pupillary reflex will be the same as when no morphin is given. This is not true. With this combination the pupil will not as a rule dilate as early in anesthesia as when no morphin has been given.

It is safe to assume that when morphin has been given, no matter in what combination, a dilation of the pupil in the conduct of anesthesia is a manifestation of careless technic on the part of the anesthetist.

NOTE: Columns D and E of this chart cannot be considered accurate for all cases. But though they may not be accurate, they are sufficient to show that in neither case is it necessary to have any dilatation of the pupil in order to secure quiet and relaxed anesthesia.

An apropos note is here in order. No anesthesia can be safely relaxed and quiet, no matter how much ether be given, if the respiratory passages be not kept freely open, or if the patient be suboxygenated. Where the respiratory passages cannot be kept constantly open, pure oxygen should be administered, whether through the ether or separately. Only thus in certain cases can the patient be relaxed.

COLUMN F—THE LARYNX; ITS MOVEMENTS.

Although an ancient sign, this movement of the larynx is not to be ignored, especialy in this classification. With the eyeball moving or eccentric the danger in conduct of the anesthesia is not that the patient may "Go out," but that he may "Come out." *There is usually at all times a rhythmical movement of the larynx up and down with the respiration. There is always the exaggerated movement of this organ up and down with swallowing. This is well manifest in the induction.*

This movement of the larynx in swallowing is of importance here in that it assists the anesthetist in guarding against vomiting during the operation. *With anesthesia coming up, at the extreme upper border of the first or upper stratum of the third stage, just before the patient comes out to the vomiting or second stage, there will occur, in the average case, an exaggerated up-and-down movement of the larynx, half a minute or so before vomiting takes place. If the little finger of the mask-holding hand be allowed to rest over the larynx, this exaggerated movement may be detected immediately it begins. There is yet time to increase the amount of ether gradually, sufficient to carry the patient back where he belongs without permitting retching or vomiting.* I say *gradually,* because if at this stage a concentrated ether vapor be suddenly administered, there will usually follow laryngeal, or pharyngeal spasm, with coughing.

THE REFLEXES UNDER OTHER ANESTHETICS.

Although this paper is intended primarily to cover the third stage of *ether anesthesia,* the significance of the eyeball in this classification is not limited to ether alone.

These signs hold good with any anesthetic agent now commonly in use, no matter what attention has been paid to preanesthetic narcotics. Morphin in any combination does not influence them. Neither does chloral or its allied drugs. *The eyeball signs are constant.*

Nitrous Oxid-oxygen.—With this mixture alone, I have never been able to get a patient anesthetized beyond the stratum of the oscillating or eccentric eyeball where the anesthesia was properly conducted. Proper nitrous oxid-oxygen anesthesia requires a pink or rose-colored patient. As long as this color is maintained it is quite out of the ordinary, if not impossible, to carry the anesthesia beyond the first stratum as herein illustrated. In *improper* anesthesia with this agent, the asphyxial element being allowed to enter, it is, of course, quite possible to so intoxicate the patient with carbon dioxid that there will occur a complete paralysis of the motor occuli muscles and a complete dilatation of the pupil. This is inexcusable technic.

Ethyl Chlorid.—Properly handled, this agent is an excellent substitute for nitrous oxid and therefore deserves mention. There is much that is new in the way of observation of the action of this agent that cannot be considered here. Suffice it to say, that with ethyl chlorid, administered slowly, as long as there is maintained only a partial paralysis of the motor muscles of the eyeball, the anesthesia is entirely safe. Ethyl chlorid should not at any time be given beyond this point.

CONCLUSIONS.

1. This is a plea for lighter and better anesthesia.

2. It is a plea for better teaching of anesthesia in our medical schools and hospitals.

3. As long as we note any movement or eccentric position of the eyeball, aside from that which might be normal for the occasional patient, that patient has not had too much anesthetic; but after anesthesia has been well inaugurated, he has had quite enough.

4. The upper part of the third stage, namely, the first stratum, is anesthesia entirely as satisfactory to the surgeon as the second, third or fourth stratum of the third stage.

517 Hume Mansur Bldg.

ANESTHESIA IN WAR SURGERY

NITROUS OXID ANESTHESIA.*

It would seem as though someone were trying to take away all the glories and thrills of an operation, when he introduces an anesthesia that eliminates the after-effects that are so characteristic of ether and chloroform, as well as increases by 20 per cent. the chances for recovery.

As an anesthetic for use in the United States Army, nitrous oxid was first suggested to the American Red Cross Commissioners, in France, by Colonel George W. Crile, M. C., U. S. A., who also made the suggestion that plant for its manufacture be erected there in order to insure a sufficient supply for all the army hospitals. To the efforts of Colonel Alexander Lambert, then Chief Surgeon of the American Red Cross, is largely due the plan that brought such highly successful results.

The best medical authorities concur in the opinion that nitrous oxid as an anesthetic is the least dangerous as well as the best adapted for use when operating upon cases of shock. As compared with ether and chloroform, perhaps a review of the chemical effects of these upon the patient will serve to prove the superiority of nitrous oxid. Great muscular exertion or wounds of the muscles cause lactic acid to be disseminated through the blood in large quantities. The body rids itself of the acid by oxidizing it, and for the most part gives it off through the lungs. When chloroform and ether are introduced into the blood that is already filled with lactic acid, they stop the oxidizing process. This results in an acid condition which will in many cases cause death. The use of nitrous oxid with oxygen allows the natural oxidation to proceed uninterruptedly. To quote Colonel Lambert's tersity: "The use, therefore, of nitrous oxid anesthesia

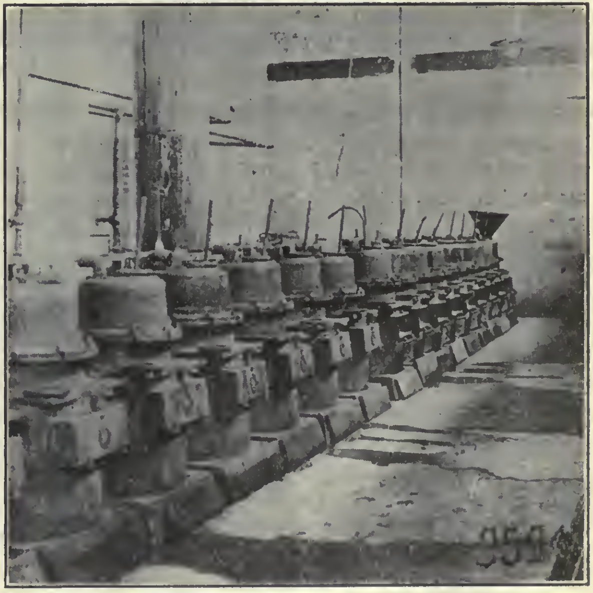


Fig. 1—Nitrous oxid generators in the American Red Cross Plant in Paris.

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* Supplied by the News Service of the American Red Cross. Courtesy of Mr. Foster, New York City Headquarters.

(*Continued on page 60.*)

American Journal of Surgery

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Avon Lake, Ohio, U.S.A.

APRIL EDITORIALS. 1920

A NOTE ON NITROUS OXID-OXYGEN ANESTHESIA.

Reporting to the Southern Medical Association on his experiences with anesthesia in war surgery, Dr. Addison G. Brenizer, of Charlotte, N. C., formerly Lt.-Colonel, M. C., U. S. Army and Chief of Surgical Service, Base Hospital, No. 6, A. E. F., says that nitrous oxid-oxygen was used between September 10 and November 14, 1918, only and during that period of 65 days, anesthesias were given as follows:

Ether	473
Nitrous oxid-oxygen	341
Local	87
Chloroform	7
	908

Publishing his observations in the *Southern Medical Journal*, October, 1919, Brenizer explains that:

"Gas-oxygen anesthesia was used during that short period, not that we did not prefer it, but because we were late in receiving our apparatus and were not able to secure more gas when our first supply was exhausted.

We have used ether overwhelmingly over other anesthetics, quite a number of infiltration anesthesias with novocain and cocain and but little chloroform. We have rarely used ethyl chlorid as a general anesthetic, but have used it frequently for small incisions locally. There was but one death we could attribute to an anesthetic and that was a death from chloroform in unskilled hands.

The tranquility of the patient, the rapidity and ease of induction, the rapidity of recovery and the safety withal, gives nitrous oxid-oxygen quite an advantage over the other anesthetics in the first and second stages of anesthesia, especially in cases where an absolute muscular relaxation is not needed. Even when ether is superimposed for deeper anesthesia, the amount is reduced to a minimum to maintain the period of relaxation.

The types of cases where gas-oxygen is most valuable are:

1. Shock cases;
2. Cases where operation is to be of short duration;
3. Cases where the condition is profoundly bad and the post-operative period treacherous;
4. Chest cases, with the exception of those liable to show hemorrhage; and,
5. Infection of the respiratory tract.

Gas-oxygen is of great value in war surgery since the greater number of delayed primary and secondary suture of wounds can be made with the use of this anesthetic alone.

The special advantages of gas-oxygen in war surgery are:

1. Ease and rapidity of inducing anesthesia, thus preventing a struggle, enabling the immediate beginning of the preparation of the field of operation and the carrying on of several parallel operations without the one disturbing or distressing the other.
2. Rapid recovery and rapid exchange of patients between operating room and ward.
3. The relief from the care of recovering patients on the wards and the consequent liberation of the personnel for other duties.

All these points are important when the large number of secondary wound closures are considered—as many as 60 in a single day.

The comfort of the patient is a decided point.

There was no death nor injury from this anesthetic."

THE NATIONAL ANESTHESIA RESEARCH SOCIETY.

In a previous issue the Editor of the SUPPLEMENT called attention to the founding of the National Anesthesia Research Society.

The Editor is now able to give in detail the objects of this organization, which are:

1. To promote the science of anesthesia and to enable its members or others, after having obtained the approval of the society, to submit to the dental and medical professions any views, findings, or accomplishments they have attained.

2. To obtain from all available sources such information as is now extant concerning any material, liquid or gas, known to have anesthetic properties.

3. To arrange, in cooperation with medical, dental and anesthesia associations, for the preparation and delivery of suitable, interesting and educational papers on the general subject, or relative to some particular anesthetic.

4. To use its influence to prevent the publication or circulation of any false or unauthentic statements concerning the science or practice of anesthesia or about any anesthetic.

5. To receive and tabulate reports of any and all conditions, symptoms or phenomea prevailing during or after anesthesia by any anesthetic and to prepare and distribute on request forms on which such information can be tabulated with uniformity.

6. To distribute by pamphlet or publication, as its funds may permit and its governing powers authorize, such reliable data as may be collected or obtained from those interested in the subject.

7. To aid, as far as possible, in the preparation, publication and sale of suitable text books on the subject of anesthesia, for use by students in elementary and post-graduate schools, and to prepare as rapidly as possible and as far as its funds permit, reference books for use by the medical and dental professions.

8. To cooperate with the state authorities and other bodies in the preparation of suitable legislation to safeguard those to whom anesthetics are administered, as well as those called upon to administer them.

9. To arrange for the production of moving picture films to illustrate to the profession the action of anesthetics on the patient during the induction and maintenance of anesthesia, and to prepare interesting articles for publication in magazines and the public press.

10. To use its influence in every way and to give its aid toward the advancement of the science and practice of anesthesia.

There will be two classes of members in the Society, those representing the business interests that are financing the movement for bettering anesthesia and duly licensed and qualified practitioners of medicine and dentistry.

The government of the Society is vested in a Board of seven Governors, five of whom represent the business interests of the organization and two the professional.

The Governors will hold quarterly meetings during the year—in February, May, August and November, in which month the Annual Meeting of the Society will also be held.

The scientific work of the Society will be largely in the hands of a Research Committee of which the Editor of the Supplement has accepted the Chairmanship and Dr. W. I. Jones, of Columbus, O., the Secretaryship. This Research Committee is empowered to secure and utilize the services of research workers and noted clinicians to cooperate with the Society in effecting the purposes previously mentioned. Any expenditures for such services shall be made at the discretion of the Board of Governors.

The ulterior purpose behind this new Society is the achievement of an Anesthesia Foundation.

The Editor of the Supplement bespeaks for the Society the cordial support and cooperation of all those who have the progress of anesthesia at heart. —Mc.M.

INTERESTING NEWS NOTES.

It will interest readers of the Supplement to learn that the anesthetists of Boston have recently organized. Also that the Anesthesia Department of Harvard Medical School has been reorganized from the teaching, clinical and research standpoints, by Drs. Freeman Allen and F. L. Richardson.

There is also a movement under way to organize the medical and dental anesthetists of Philadelphia. Mr. Stephen Morris of the National Anesthesia Research Society and Dr. Theodore D. Castro are urging the matter.

Word comes from Cincinnati that Dr. John C. Oliver, Acting Dean of the University Medical School, is heading a movement to establish a Chair of Anesthesia in that Institution. If his plan eventuates it will be the first Chair in this subject to be established in any American Medical School.

Every effort is being made to have a worthwhile paper on anesthesia presented before every important medical and dental meeting during 1920. Your individual coöperation is requested in accomplishing this purpose. Do not hesitate to secure a place on the program of a meeting in your vicinity and use every effort to give those in attendance the most recent progress in your specialty with which you are familiar.

NITROUS OXID ANESTHESIA.

(*Continued from page 57.*)

to the exclusion of ether or chloroform in the case of at least the seriously wounded, seems to me not only advisable, but beyond the advisability of discussion."

Nitrous oxid was therefore first used at the casualty clearing stations, the Americans and British cooperating for the sake of an exchange of ideas as to its use. The American Red Cross supplied an apparatus of special design that had been worked out from those already in use. This apparatus allowed the separate administration of nitrous oxid, of oxygen, of ether (which was at times used in small quantities) or of the three in various combinations. As soon as was feasible, a meeting of surgeons was held in order to discuss the question of anesthesia and it was decided to use nitrous oxid to a much greater extent than had been done.

The beneficent aspects to surgery in the use of nitrous oxid as an anesthetic show the following advantages: no added shock to shock patients, no lowered vitality, less toxemia, less post-operative respiratory complications, speed, *i. e.*, quick return to consciousness, thus leaving the nurses free the sooner to give care to other patients. Its use has been found to be especially beneficent in cases of shock, hemorrhages, infection, gas gangrene, thoracic cases, removal of foreign bodies, and in some brain cases.

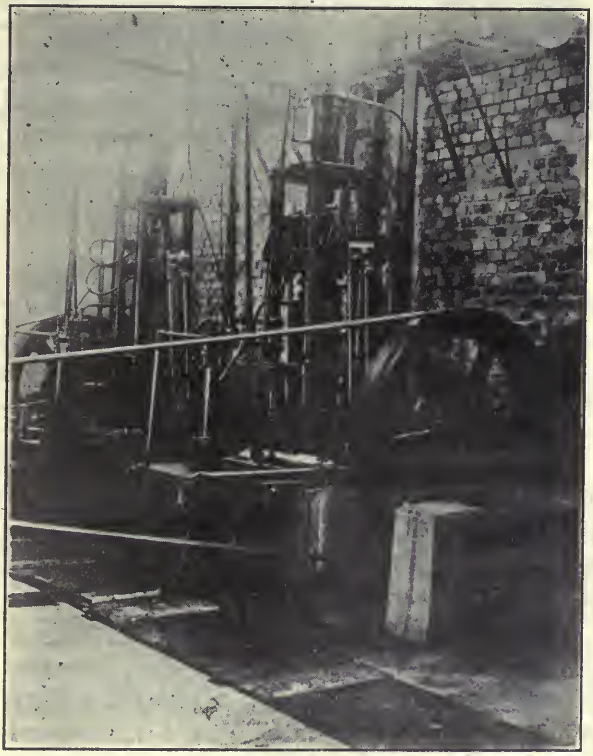

Fig. 2—Gas-compressors in the American Red Cross Plant in Paris.

At the time the armistice was signed, the nitrous oxid service had facilities for supplying every hospital in France. Thousands of our soldiers' lives had been saved by its use, and it was through the efforts and enthusiasm of the Americans that the British adopted its use more generally, while the French were beginning to credit its value.

One lieutenant colonel, who believes in "rendering unto Cæsar," sums up his general opinion:

"Without the American Red Cross backing, this work could not have been done, nor could its clinical application have been possible had not the Red Cross fostered the manufacture and delivery of nitrous oxid and provided an apparatus for its administration."

Abstracts

A Résumé of the International Current Literature of Anesthesia and Analgesia

Increased Alkalinity of the Blood in Shock. B. Moore. *Lancet*, September 13, 1919. Vol. 2, No. 5011.

Moore claims that the outlook on the chemical conditions in shock is all wrong, and this is why the invariably underlying presence of "acidosis," to which at first much attention was given, became later neglected. All cases of serious secondary shock show so-called "acidosis," but this acidosis is not "acidosis," it is "alkalosis." So all the attempts of physiologists to mimic it have been abortive. When the pressure of free carbonic acid in the blood is decreased then alkalinity rises and kidneys and tissue cells remove alkali from circulation. It is for this reason that the circulating bicarbonate decreases, and so lowered titration figures are obtained, but the blood is more alkaline. A fall in bicarbonate reserve to one-third of normal can be caused by a small fall in pressure of carbon dioxid and accompanying increase in alkalinity. When primary shock occurs from sudden heart failure, from emotional causes, hemorrhage, pain, or some such stimulus, there is cerebral anemia and unconsciousness. There is a general cessation of metabolic activity at first and a shutdown later to about one-third of the normal rate. If there be a closure down in the tissues to one third, what must happen if the lungs go on working at their normal rate or even at one-half their normal rate? An excess of carbon dioxid over that produced must be removed in the lungs and the blood go alkaline, and this is what occurs in secondary shock. During the period of fainting both heart and respiration are held in abeyance, the heart perhaps more than the respiration, and there is a venous condition which favors recovery, but later there is a condition in which respiration exceeds circulation and the blood becomes more alkaline and carries shock to the nerve centers and heart. If as a result of a primary shock the circulation is only working at one-third its usual speed, and the respiration is going on at the usual rate, the amount of carbon dioxid produced will only be one-third of the normal, while elimination proceeds at normaal rate. The result must be that the alkalinity of the blood increases, any such increase leads to heart failure. Hyperpnea need not necessarily be an antecedent factor to surgical shock. In the main, the condition depends on relative rates of circulation and respiration, although other conditions, such as toxic products from wounds and muscle injury and fatigue of nerve centers, undoubtedly play a part.

Tonsillectomy and Thymus Death. H. Burger. *Nederlandsch Tijdschrift* v. *Genceskunde.* May 31, 1919, Vol. 1, No. 22.

Burger reports the death of a youth of 15 under chloroform for tonsillectomy. The anesthesia and the operation had proceeded smoothly but immediately after the operation had been concluded, the heart action and respiration stopped. Necropsy showed the thymus more than twice the normal size, and the thymicolymphatic status explained the fatality. This status seems to be paricularly dangerous for goiter operations, and judging from Burger's own case and three he has found on record, the same is true of tonsillectomy. Kofler's fatal case was the only fatality in his 6,000 tonsillectomy cases, and Kafemann's in 10,000. In one of the thymus death cases, death did not occur till the following day, after an interval of respiratory disturbance. In all the others death occurred at the close of the operation, before rousing from the anesthetic. Burger adds that there does not seem to be any certain means for detecting the thymicolymphatic status beforehand; aneurysm or retrosternal goiter may stimulate a large thymus.

DIRECTORY OF ANESTHETISTS

The Supplement herewith begins the publication of the Membership Lists of American and Foreign Associations of Anesthetists so that a more or less complete Directory of Anesthetists may be developed for the interests of all concerned in advancing the specialty of anesthesia. The editor would appreciate having the secretaries of the various associations and societies send him complete lists of their membership with corrected addresses. The editor also desires the names and addresses of those not affiliated with any organization, but who routinely administer anesthetics. Any information for making this Directory more accurate or complete will be appreciated.

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1624 Allen Street.

Klaus, E. .... Cleveland, Ohio
1699 West 25th Street.

Kruskal, I. D. .... Brooklyn, N. Y.
259 Brooklyn Avenue.

Larkey, C. J. .... Bayonne, N. J.
42 West 22nd Street.

LaRocque, C. .... Montreal, Canada
569 Rue Durocher

Lee, Edw. Wallace .... New York City
616 Madison Avenue.

Lewinson, Bella .... Erie, Pa.
321 East 8th Street.

Leland, Roscoe G. .... Kalamazoo, Mich.
1545 Spruce Drive.

Liebowitz, Abram .... New York City
302 Central Park West.

Long, Wm. Hamilton .... Louisville, Ky.
2214 Deering Court.

Luke, H. Clifton .... New York City
204 West 110th Street.

Lumbard, Jos. E. .... New York City
1925 Seventh Avenue.

Lux, Paul .... Kansas City, Mo.
1034 Rialto Building.

Mackay, Arnold J. .... New York City
145 West 41st Street.

Madigan, Mary V. .... Portland, Ore.
Dekum Bulding.

Mason, Herbert B. .... Calais, Maine
173 Main Street.

Maurits, Reuben .... Grand Rapids, Mich.
Metz Building.

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Highland Building.

Martin, Jean M. .... San Francisco, Cal.
391 Sutter Street.

Maxson, Louis H. .... Seattle, Wash.
806 American Bank Building.

Meltzer, S. J. .... New York City
13 West 121st Street.

Miller, Albert H. .... Providence, R. I.
131 Waterman Street.

Marr, Harrington .... Nashville, Tenn.
301 Eve Building.

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Base Hospital.

McConkey, Frank V. .... York, Pa.
237 South Pine Street.

McCullum, Josephine .... Chicago, Ill.
29 East Madison Street.

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845 Ardmore Avenue.

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1128 Tuscalova Avenue.

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2233 Ashland Avenue.

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37 South William Street.

McMechan, F. H. .... Avon Lake, Ohio
R. F. D.

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524 Sutter Street.

Murphy, Mary T. .... San Francisco, Cal.
3732 Sacramento Street.

Mytinger, Walter H. .... Cincinnati, Ohio
5 Garfield Place.

Nagle, F. M. (Deceased).

Oldenbourg, Louise A. .... San Francisco, Cal.
1547 Clay Street.

Onderdonk, W. A. .... Louisville, Ky.
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Palmitier, Adele L. .... Brooklyn, N. Y.
1556 New York Avenue.

Patterson, Harry B. .... Pittsburgh, Pa.
1300 Sheridan Avenue.

Palmer, Caroline .... San Franciscco, Cal.
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Pick, Chas. J. .... New York City
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Pinneo, Frank W..........................Newark, N. J.
119 Garside Street.

Potter, Claudia..........................Temple, Tex.
Fifth and Avenue F.

Ream, F. R..........................New York City
Aeolian Hall, 42nd Street.

Reid, K. Lowder..........................Atlanta, Ga.
294 Courtlandt Street.

Reid, Mont. R..........................Baltimore, Md.
Johns Hopkins Hospital.

Rayhill, John W..........................Utica, N. Y.
196 Genesee Street.

Rapoport, Boris..........................Dorchester, Mass.
38 Columbia Road.

Remy, Edward..........................Mansfield, Ohio
89 West Third Street.

Reynolds..........................Buffalo, N. Y.
322 Fox Street.

Rice, Allen Galpin..........................Newton, Mass.
42 Eldridge Street.

Rice, Ray A..........................Columbus, Ohio
1529 Menlo Place.

Richardson, Frank L..........................Boston, Mass.
543 Boylston Street.

Richmond, Claude E..........................Colorado Springs, Col.
222 East Dale Avenue.

Ritter, Daniel..........................Punxsutawney, Pa.
Farmers and Miners Trust Building.

Roberts, Jean M..........................Los Angeles, Cal.
3014 Kenwood Avenue.

Rosenzweig, Louise..........................Brooklyn, N. Y.
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Saffort, Henry T..........................El Paso, Tex.
504 Roberts-Banner Building.

Salzer, Moses..........................Cincinnati, Ohio
55 Groton Building.

Seybold, John W..........................Denver, Col.
304 Mack Building.

Seymour, Eleanor..........................Los Angeles, Cal.
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Shaw, Wm. F..........................Brooklyn, N. Y.
775 Washington Avenue.

Shea, Bernard F..........................Brooklyn, N. Y.
323 Stuyvesant Avenue.

Shroeder, P. H..........................Davenport, Iowa

Sise, Lincoln T..........................Boston, Mass.
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Spofford, Henry M..........................Batavia, N. Y.
33 Bank Street.

Shannon, W. T..........................Detroit, Mich.
641 David Whitney Building.

Smith, A. E..........................Chicago, Ill.
220 South Lincoln Street.

Sykes, Wm. S..........................Cleveland, Ohio
3794 West 25th Street.

Talman, Geo. P..........................Watsonville, Cal.

Teter, Chas. K..........................Cleveland, Ohio
946 Rose Building.

Thomas, V. D..........................Bloomington, Ill.
309 Livingston Building.

Tuers, G. Edward..........................Paterson, N. J.
418 Park Avenue.

Tyler, Everett A..........................Philadelphia, Pa.
1825 Chestnut Street.

Vedin, Alma..........................New York City
224 East 15th Street.

Varzhabedian, M. A..........................Baltimore, Md.
650 North Carey Street.

Vinciguerra, Michael..........................Elizabeth, N. J.
1071 Elizabeth Avenue.

Walker, Harold G..........................Wyckoff, N. J.
Everett Avenue.

Waters, Ralph M..........................Sioux City, Iowa
539 Frances Building.

Wells, Chas. J..........................Syracuse, N. Y.
1932 South Salina Street.

Wenger, Aaron V..........................Grand Rapids, Mich.
209 Metz Building.

Winter, George B..........................St. Louis, Mo.
517 Frisco Building.

Worley, John R..........................Dallas, Tex.
3407 Gaston Avenue.

Yankey, W. E..........................Atlanta, Ga.
1101 Flatiron Building.

Young, T. A..........................Toledo, Ohio
501½ Oak Street.

Zabrochi, J. A..........................Chicago, Ill.
35 East Washington Street.

Society Proceedings

Membership in a society devoted to your specialty is an essential to success.

AMERICAN ASSOCIATION OF ANESTHETISTS EIGHTH ANNUAL MEETING.

The American Association of Anesthetists will hold its Eighth Annual Meeting in New Orleans, April 26-27, the first two days of A. M. A. Week.

The Hotel Grunewald has been selected as headquarters for the meeting as well as for the scientific sessions.

An interesting and instructive program is being developed for this occasion. Among the papers and speakers tentatively scheduled the following may be mentioned:

Some Anesthetic Relations (Presidential Address). Albert H. Miller, Providence, R. I.

Some Data Regarding Anesthesia for Experimental Surgery, Frank C. Mann, Rochester, Minn.

Some Remarks on Cotton-Process Ether from an Experience of 800 Administrations. Jos. E. Lumbard, New York City.

Combinations of Various Drugs for Induction of Anesthesia and Analgesia by Oral Administration with Report of Cases. A. Ficklen, New Orleans.

Postoperative Pneumonia. Jno. R. Worley, Dallas, Texas.

Deaths Under Anesthesia. Ralph M. Waters, Sioux City, Iowa.

Certain Perfected Methods of Anesthesia for Military Surgery, Especially Neurologic Operations. Ray A. Rice, Columbus, O.

Advances in Pure Gas-Oxygen Anesthesia. E. I. McKesson, Toledo, O.

The Problem of Anesthesia for Major Operations on Infants and Small Children. E. M. Prince, Birmingham, Ala.

Methods of Eliminating the Lay-Anesthetist, George Piness, Los Angeles, Cal.

The Open Method of Administering Gas-Oxygen Anesthesia. J. T. Gwathmey, New York City, N. Y.

Chloroform as a Relexant in Gas-Oxygen Anesthesia. Ansel Caine, New Orleans, La.

A feature of the program will be a Symposium on the Anesthetic Problem in Goiter Operations, during which the following pertinent papers will be presented by well-known authorities on different phases of the subject:

General Considerations. Andre Crotti, Columbus, O.

General Anesthesia for Goiter Operations. Vilray P. Blair, St. Louis, Mo.

Value and Results of Nitrous Oxid-Oxygen and Local Anesthesia in Goiter Operations. Lincoln T. Sise, Boston, Mass.

The Application of Anociation to Goitre Operations. Wm. E. Lower, Cleveland, O.

Thyroidectomy under Local Anesthesia. Carroll W. Allen, New Orleans, La.

Ether-Oil Colonic Anesthesia for Goiter Operations. Walter H. Lathrop, Hazelton, Pa.

The Annual Dinner will be served at the Hotel Grunewald on the evening of April 26, at 6:30 o'clock and will be enlivened with music and clever after-dinner speaking.

For membership, dinner reservations and further particulars, address F. H. McMechan, M.D., Secretary-Treasurer, Avon Lake, O., R. F. D.

Quarterly Index

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AMERICAN
JOURNAL OF SURGERY

Vol. XXXIV. MAY, 1920. No. 5

NEW INTRANASAL PROCEDURES FOR CORRECTION OF DEFORMITIES OF THE NOSE, SUCCESSFULLY APPLIED IN OVER 1,000 CASES DURING THE PAST TWELVE YEARS.

Gustav J. E. Tieck, M.D., F.A.C.S.,
Surgeon, St. Mark's Hospital, Nose and Throat Dept.,
New York.

Unfortunately, cosmetic surgery, and particularly cosmetic surgery of the nose, has not received serious attention during the past twenty-five years, while surgery in other branches has made such marked advance. The greater part of this work has been performed by quacks of the medical profession and laymen without surgical training. The correction of deformities of the nose has never been placed on a scientific basis. The reasons for this are manifold. Surgeons have feared to attempt this pioneer work because of the possibility of bad results, and ensuing irreparable disfigurement of the face, or the danger of law suits. Again, such correction is desired simply to improve appearance, and therefore is not definitely within the field of that type of surgeon, who feels that it is his duty to heal rather than to beautify.

When, however, facial disfigurement is such as to cause serious social, or business embarrassment, it is a real and potent cause of unhappiness. Men and women in business and professional life know the value of good appearance. Young women of marriageable age, particularly, feel keenly the disadvantage of distorted features. If the surgeon can scientifically, and without danger or inconvenience, improve facial appearance in such cases, he is ministering to a legitimate and important demand, worthy of his best efforts. The unfortunate individual who suffers financially, socially, or mentally, because of a hideously formed nose, has as much claim to the skill of the surgeon, as the one with an ugly facial scar, nevus, or other blemish has, to the skill of the dermatologist.

The methods described in the following article, have been carefully tested and perfected in the past twelve years, during which time, I have operated upon over one thousand patients. As far as I know, similar work has been done by Joseph of Berlin, Roe of Rochester, N. Y., and Iglauer of Cincinnati. I have hesitated for many years before presenting my methods to the profession, simply to be absolutely certain of my ground, and to have given myself ample opportunity to observe all failures and the reasons therefor, to improve the details of technique, and to observe remote results. The results have been uniformly satisfactory, and in most cases excellent.

I believe that I have placed this branch of surgery on a definite scientific basis. The procedure is simple. The fundamental principles are proper exposure and hemostasis as in all other surgery. The original features of my methods, are the means of attaining that exposure from within the nose.

The deformities usually encountered are: The hook or bent nose, the saddle nose, the laterally deviated or bent nose, and the long nose. These deformities are usually inherited, although they may be due to trauma or disease. Lateral deviation is often due to trauma or deviated septum. Saddle nose may be due to syphilis. I have not yet attempted to use my methods in syphilitic cases. All the other above mentioned deformities are amenable to correction. A contra-indication to the operation is infections in the accessory sinuses, eustachian tube or middle ear. Only healthy young or middle-aged people should be operated upon.

Anesthesia. The operations are all performed under local anesthesia, for the same reasons that most other intranasal procedures are. Hemorrhage is diminished, and even if it occurs, there is no danger of aspiration of blood, as in the unconscious patient. With thorough infiltration, the operation is absolutely painless, and practically bloodless. The operation is performed in the sitting posture, so that the patient can be of aid to the surgeon, by holding his head in any desired position.

Cocain and epinephrin (adrenalin) are used exclusively. The mucous membrane of the nose is carefully painted with a ten per cent. solution of cocaine as thoroughly as for a septum operation This is repeated once, and followed by a similar application of 1/1000 solution of epinephrin. After a few minutes, the submucous region of the nose over the septum and lateral cartilages is injected with about two drams of the following solution:

Sol. cocain hydrochlorid 10% ....gtt. xv

Sol. epinephrin, 1/1000 ....gtt. xxx
Sterile water ....℥iii

This is also injected subcutaneously over the bridge of the nose, and laterally over the cartilages, well out over the maxillary bones.

The inner aspects of the alae of the nose are now painted with iodine as well as the cutaneous area over the nose and cheeks. The excess iodine is washed off with alcohol, and the patient is then ready for the operative procedure.

The operative procedure is divided into two stages: First, the exposure; second, the actual correction or reconstruction. The exposure is practically the same in all cases, although there may be slight variations from the type, depending on the nature of the deformity.

Four intra-nasal incisions are usually required in each nasal fossa, to obtain the necessary separation of skin and periosteum from bone. Occasionally only two or three may be necessary.

The first incision is made along the border of the pyriform opening of the nose. Beginning at the lower end of the nasal bone, it is carried downward and outward, through the mucous membrane and chondro-osseous junction. An elevator is passed through this incision, insinuated between the periosteum overlying the nasal and maxillary bones, and the bones, and swept laterally and mesially, lifting off the periosteum, subcutaneous tissue, and skin, from the bone. The entire area extending from the root of the nose, laterally over the nasal bones and superior maxillae is so liberated.

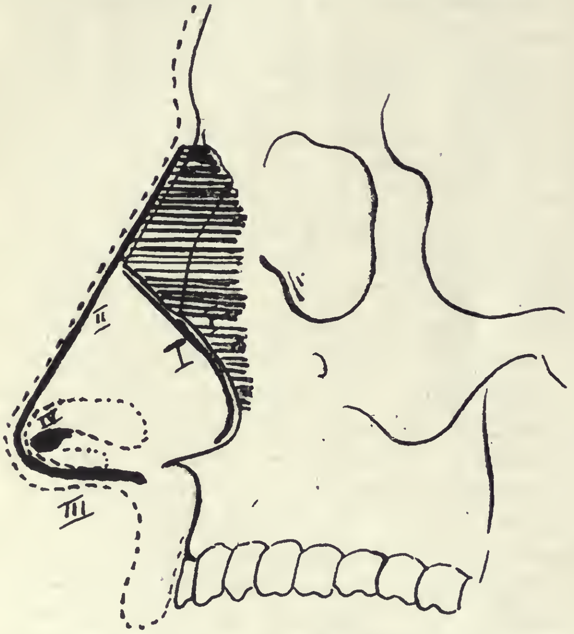
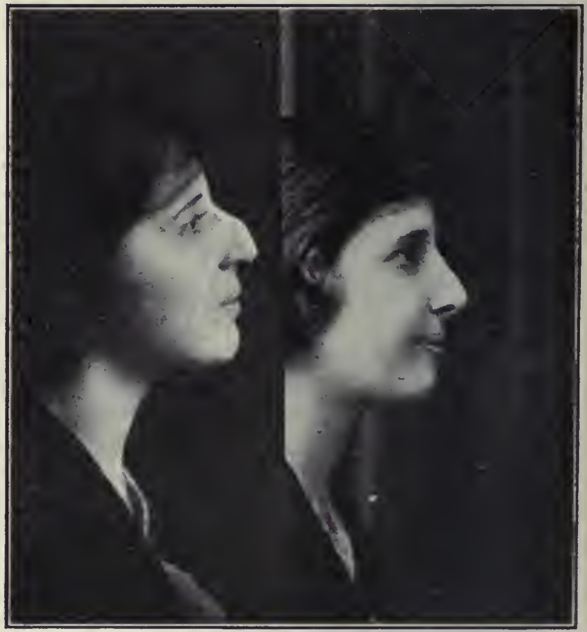


Diagram illustrating the four incisions, and part of the area where the soft tissues are separated from the bone.

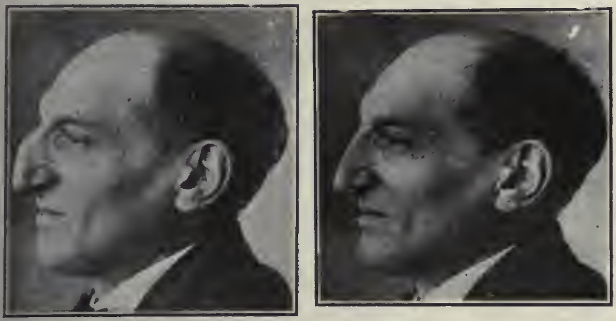
The second incision is made parallel to the bridge of the nose. Beginning at the lower end of the nasal bone, it is carried downward and forward, along the anterior edge of the bony and cartilaginous septum to the tip of the nose. This incision is carried through the cartilage, up to the perichondrium overlying the bridge of the nose. Then by careful dissection, the perichondrium and soft tissues over the bridge of the nose, and lateral cartilages, are separated from the underlying bony and cartilaginous septum, and lateral cartilages.

At this stage, one should be able to sweep the elevator freely over the bridge of the nose, from roots to tip, and laterally well out over the cheeks, in the artificial space created between periosteum and bone, and between perichondrium and cartilage. It is absolutely essential that this area be entirely freed in all operations, in order to attain uniform shrinkage, without formation of wrinkles or dimples, which would occur if at any point the overlying tissues remained in contact with the bone.

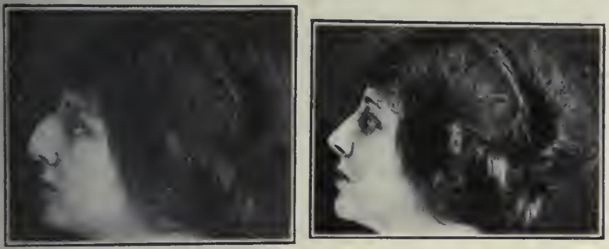


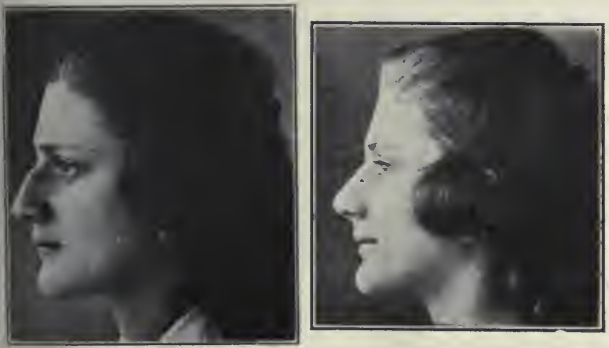
A third incision is made from one nostril to the other. Beginning at the end of the second incision (tip of the nose) it is carried backward along the lower border of the quadrilateral cartilage, to the nasal crest of the superior maxillary bone. This incision passes through mucous membrane and cartilage. A fourth incision is made through the lower lateral cartilage at the point where the cartilage bends upon itself. This incision divides the lower lateral cartilage into an external and internal half. The last two incisions are necessary to permit the requisite exposure for plastic work on the septum and cartilages.

Through the above-mentioned incisions, every variety of nasal deformity can be corrected. I shall outline only briefly the methods used in the typical cases, but it must be borne in mind that each case presents its own problem and often requires a combination of the methods to be described.

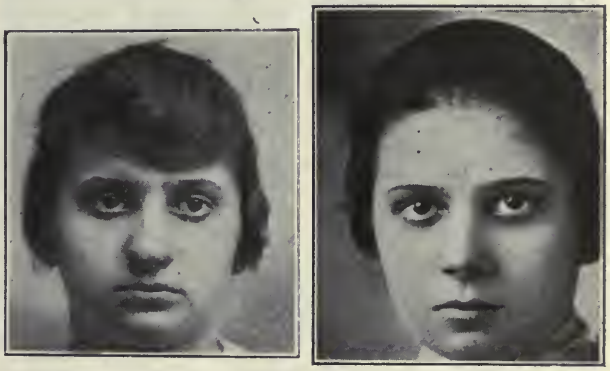


Correction of the hook-shaped deformity. By means of a saw and rasp the nasal bones, at their junction with one another, are pared down to the proper height, and the protruding bony and cartilaginous septum trimmed with a pair of scissors, the skin moulded and placed into position. Should the nose appear too broad after the removal of the hump the remaining part of the nasal bones, together with the frontal processes of the maxillary bones, are forced over and bent inward into the desired position. In young subjects these bones are easily bent, but in adults, part of the frontal processes of the maxillary bones must be dislocated by cutting through them with a saw. In either event, the bones are held in position by internal and external splints.

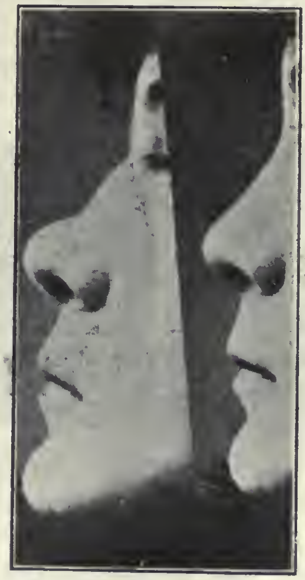




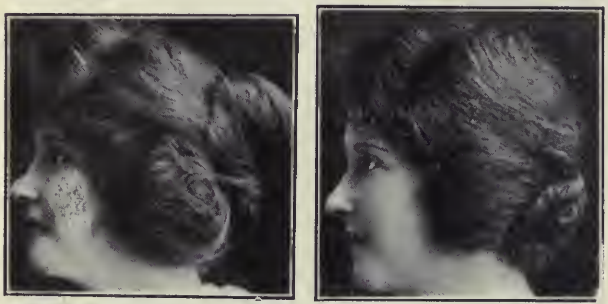
Shortening the Nose. This is accomplished by resecting a triangular piece of cartilage, together with its perichondrium and mucous membrane, from the lower part of the quadrilateral cartilage. The base of the triangle is along the anterior border of the septum, its apex at the nasal crest of the superior maxillary bone. The lower part of the nose is then elevated, the edges of the wound brought together and sutured. The size of the triangular piece of cartilage to be removed depends upon the desired length of the nose. One must be careful therefore, not to remove too large a piece, for fear of shortening the nose too much. To avoid this it is advisable to remove the cartilage piecemeal, and to occasionally tilt the tip of the nose upward, until the proper amount has been resected.



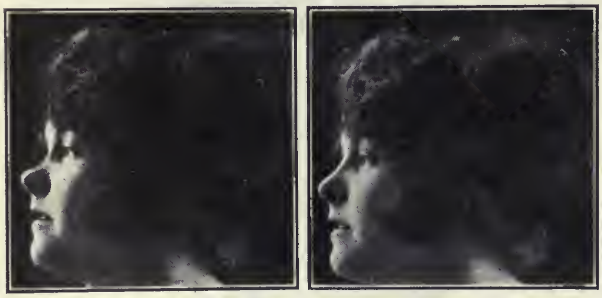
Reducing the size of the tip and alae. The tip of the nose is reduced by resecting a crescent-shaped piece of cartilage from the tip, on each side, and suturing the edges of the wound together. The alae nasi are reduced in size by resecting a crescent-shaped piece of cartilage from each wing and suturing the edges of the wound together.



Correction of lateral dislocation of the nose. In order to be able to force the nose sideways into the median line, the upper end of the anterior part of the bony septum, situated in front of and below the cribriform plate of the ethmoid must be resected. This part of the septum, because of its wide base, is very strong and rigid. Any forcible side pressure thereon is very apt to cause a fracture of the cribiform plate of the ethmoid, with probable disastrous results; hence the extreme importance of resecting this anterior upper part of the septum before even attempting to force the nose into the median line. Having complied with this requisite the nasal bones, together with a part of the frontal processes of the superior maxillary bones, are dislocated by means of a chisel and saw and then forced into the median line. The forcible side pressure dislocates the fronto-nasal suture.

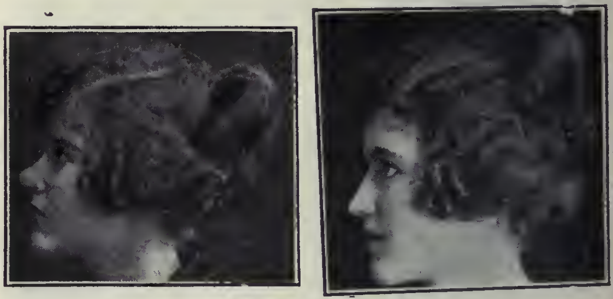


Correction of sagged-in bridge or saddle nose. This is obtained by elevating the nasal bone and filling in the defect with a transplant of the middle or inferior turbinate bone. By means of a chisel introduced into the nose the nasal bones are completely detached from the frontal process of the superior maxillary bones and from the nasal processes of the frontal bone, and then elevated sufficiently to raise the bridge of the nose to the desired level. Then the piece of middle turbinated bone, properly shaped and denuded of its mucous membrane, but not its periosteum, is placed between the anterior edge of the bony septum and the nasal bones. The graft is held in place by gauze inserted into each nasal cavity.



In two or three days the graft is firmly attached. Within three weeks, the transplant has become hard and firm, by organization. In deeper depressions it is necessary to use the inferior turbinals. In milder cases the middle turbinate is large enough. These bones are admirably adapted for this purpose, on account of their vascularity, their convenient thickness, their ease of access during the intranasal operation. If the turbinal bone is not completely removed, the greater part of it will probably regenerate, and the resultant atrophy is very little. I have observed cases ten years after the inferior turbinate had been removed, (as was generally done ten years ago before the septum operation came into vogue) in which the bone had completely regenerated. I have transplanted turbinals from one patient to another, from negroes to whites, and from whites to negroes. Almost all of them became fixed.

Results. In nearly all cases there is a certain amount of post-operative edema, and a mild periostitis, causing an apparent widening of the nose. This usually disappears in a short time under ice applications. But, one may expect continuous improvement for six months. Out of one hundred transplants, only five broke down. In two of these the infection was caused by a chronic ethmoiditis. Out of 780 cases of hook-nose, ten became infected, with resultant acute periostitis. These were relieved by proper drainage, without impairing the final cosmetic result. As far as final results are concerned I have appended a few photographs showing typical deformities before and after operation. These pictures need no explanation. They speak for themselves.



One word of caution. Although the methods are comparatively simple, care, experience and judgment are required to obtain good results. Fine discrimination is necessary to determine just how much bone to remove or how much to insert. There are many little devices, tricks, and minor mechanical details, that can be acquired only by long observation and practice. I therefore take this opportunity to invite my colleagues who are interested, to my clinic at St. Marks, where they may see the operations at close range, and observe the after-results.

40 East 41st Street.

THE SURGICAL CORRECTION OF THE AQUILINE OR HUMP NOSE.*

Seymour Oppenheimer, M.D., F.A.C.S.,
New York.

Plastic and cosmetic surgery in general has signally failed to keep apace of the tremendous advance which has been made in other domains of surgery, and furthermore, cosmetic surgical endeavors seem to have fallen into more or less disrepute until the advent of the war when reconstruction became the by-word. It was Rochefoucald who declared that "ordinary men condemn that which is beyond them" and because they know nothing of the work and because its methods were shrouded in mystery and popularly presumed to be encircled by insurmountable difficulties that many otherwise well qualified rhinological surgeons know comparatively little of cosmetic rhinoplasty, and because of their ignorance they kept aloof.

I shall take up only one phase of the cosmetic surgery which the rhinological surgeon is called upon to perform, namely, for the aquiline or hump nose.

This type of nasal deformity is comparatively common, in fact it is probably the nasal imperfection for which the rhinologist is most frequently consulted. It is perhaps as well one of the easiest to correct in the majority of cases which come to operation, and the cosmetic end-results of rhinoplastic correction here, are usually very satisfactory, both to the patient and to the operator.

In variable degree in this condition the nose is too prominent over the osseous bridge, the deformity varying from a slight prominence over the bony dorsum of the nose, to an oversized nose with marked convex deformity, involving perhaps both the bony and cartilaginous dorsum from the frontal eminence to the nasal trip. In such marked cases of hump nose the roentgenogram reveals the nasal bones as thickened considerably, massive and curved. The condition may be congenital in origin, or it may be resultant from trauma. While various external operative technics have been devised for the correction of this condition, the intra-nasal method has proven so far superior from a cosmetic standpoint, that it has been almost entirely adopted as the operation of choice in all except perhaps the most exaggerated deformities, where a combination of methods must sometimes be employed to insure best results.

The general preparation of the patient and the local anesthesia induction is so well known that it will therefore be omitted.

Operative procedure: The tip of the nose is elevated and with a small scalpel a short semi-circular incision is made in the antero-lateral portion of the nasal vestibule, just below the point of junction of the lateral cartilages with the nasal bone. Through this incision, small blunt-pointed scissors or blunt dissectors of the Freer type, are introduced between the nasal bone and the overlying integument and the skin over the dorsum of the nose is thoroughly undermined, the extent of the undermining being, of course, determined largely by the size of the hump to be removed—care being taken to avoid puncture of the skin during this undermining process. Where the hump is moderate in size, undermining may be satisfactorily accomplished through incision in one vestibule, usually the left, but where conditions require it a similar intranasal incision may be made through the other vestibule and through this the process of undermining is completed.

A small saw, scissors or rasp is introduced through the incision made, and the hump removed therewith. Usually the rasp will be found very satisfactory, and with a forward and downward motion (paralleling the nasal ridge) the anterior borders of the nasal bones are trimmed down until the hump is obliterated to a sufficient degree. Where the base from which the hump is removed, appears to be very broad and sharp, the edges may be rasped off or shaved down with a small chisel. There is usually little bleeding, and oozing of any extent may be controlled by local applications of thromboplastin on cotton, after which rubber tissue drainage strips are inserted through the primary intranasal incisions and carried well up on the dorsum of the nose. These drainage strips should be allowed to remain in situ for three or four days, or longer if deemed desirable. The nostrils are lightly packed with petrolatum-gauze, or with bismuth-petrolatum gauze. Local inflammatory reaction may be checked by prompt institution of iced compresses locally, although in many cases it is remarkable how little local reaction is aroused. A splint of dental compound molded to fit the patient's nose, and held in place by adhesive straps, affords excellent protection against injury. The following day the nasal packing is removed, and the nose cleansed of clot and secretion with warm nasal douching. Inhalation of medicated steam vapor assists in the reduction of the swollen tissues. Under this treatment the nasal structures return to a very normal appearance in a fairly short time, but the patient should be warned that it may be several months before all trace of inflammatory reaction and thickening of the tissues have disappeared, and the full benefit obtained in a cosmetic sense. A photograph or plaster cast taken before and after the operation is advisable in all cases.

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*Presented at a meeting of the American, Laryngological, Rhinological and Otological Society, at Newark, N. J., February 7, 1920.

In cases where the hump is so exaggerated that we have in addition an oversized nose with involvement of virtually the entire nose from the frontal notch to the tip, a more extensive undermining of the skin is necessary than where it is simply a question of removal of a hump. The undermining here should extend from the frontal eminence to the nasal tip, and also over the nasal processes of the superior maxillae where the nasal base is also to be narrowed.

In reduction of the height of the nose, after sufficiently extensive undermining, the nasal bones are sawed through from above downward, commencing at the frontal notch, and the required amount of bony dorsum removed. Next the cartilaginous portion is trimmed with the scalpel in a similar manner, the detached tissue being removed through the intranasal incision. Where an opening is made into the nasal chambers in this procedure, no ill-effects appear to ensue, although some authorities caution against it.

After reduction of the height of the dorsum of nose, the length and width may appear increased, and the lobule brought into greater prominence than before. Where it appears desirable to produce a reduction in the width of the nasal base, this may be accomplished by sawing through the two nasal processes at their junction with the superior maxillae, an elevator first separating the periosteum. The lower edges are then made to approach the middle line of the nose through pressure of the thumb and index fingers, and the nasal bones fractured at the naso-frontal junction. Where necessary to bring about a sufficient degree of mobility of the nasal processes and nasal bones, they are seized with forceps such as the Adam's or other similar instrument, one blade being inserted through the incision and the other in the nasal vestibule.

Where the lessened height of the dorsum makes the top of the nose seem broader and flatter than desired, the condition may be remedied by slanting the superior edges of the nasal bones inwards toward the median line.

In case the whole nose is too long, it may be shortened by resection of a triangular piece of the cartilaginous septum, taken horizontally from its inferior border, with inclusion of a part of the membranous septum beneath. The 3 to 5 mm. wide base of this triangular septal resection is placed anteriorly immediately beneath the nasal tip, with its apex at the inferior nasal spine. The septal incision may be made with any appropriate sized straight scalpel, and next after this triangular piece of septum, including its mucosa on both sides, is removed, the tip and columna are attached by suture to the freshly created inferior margin of the triangular cartilage, which has the effect of elevating the nasal tip as well as rendering the septum shorter. If it is necessary, the lateral walls of the nose are next narrowed by removal horizontally from the inside of each nostril, a trifle above the lower lateral cartilage, of a triangular strip which includes both mucous membrane and cartilage. The size of the strip thus extirpated determines the degree in which the lateral walls are made narrower. Closure of the wounds made incident to this last step, may be effected by several silk sutures.

In conclusion, let me say that the world war, with its pressing demands for the practice of reconstructive surgery for the relief of the maimed and disfigured, has not alone brought cosmetic rhinoplasty into its own, ethically speaking, but has likewise created a great demand for surgical workers trained to take care of the large number of head and face injuries incident to warfare, injuries where surgical work of a cosmetic and reconstructive nature is particularly indicated and within the province of the rhinological surgeon.

With the necessity of this restorative work of war trauma the time seems auspicious not only for all cosmetic surgery and cosmetic rhinoplasty in particular, to be elevated to its proper dignity in the profession, to be popularized and made available for the large number of individuals in civil life who could be benefited in mind no less than in feature, but also, what is all-important, to rescue this class of surgery from the clutches of the charlatan and the advertising "beauty doctor" whose conspicuous signs and blatant advertising have long preyed upon and ensnared the credulous among the laity.

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THE SUBMUCOUS RESECTION OF THE NASAL SEPTUM.

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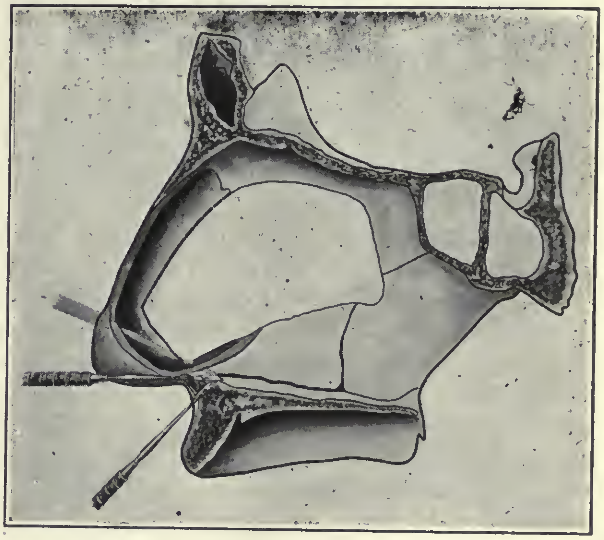
New York.

The submucous resection of the nasal septum to correct deviation has become the recognized operation. It is an operation of comparatively recent origin superseding the sawing and crushing operations. The former operations destroyed a great deal of the mucous membrane of the nose and the post-operative treatment by various kinds of plugging was painful and sometimes indefinitely prolonged.

The nasal septum is a partition between the two nares and should be perpendicular and have parallel surfaces. The septum is seldom perfectly straight but usually presents deviations from the median line and is also the seat of thickening and spurs. If the deviation, thickening and spurs are small and do not cause any interference with the breathing or drainage from the sinuses they are of little importance but when they do cause trouble they demand surgical interference. The chief indication for the submucous operation is in those cases where there is nasal obstruction to such an extent that the patient suffers and his health is seriously impaired. The deformity may cause obstruction of the drainage of the sinuses, chronic pharyngitis, laryngitis, chronic catarrh of the middle ear; and I should like to emphasize the importance of the operation for the relief of asthma and hay fever in many cases. These diseases both belong to the class of nasal reflex neuroses due to hyperesthesia of the nasal mucous membrane, probably in the ethmoid region. This hyperesthesia is caused by continued irritation of the sensitive nerves by such substances as dust, tobacco smoke, the effect of steam heat, and irritations of all kinds. In narrow noses dust particles and chemicals seem to cause more irritation; therefore, before the nasal reflex neuroses can be treated, free passage for air through the nose must be provided and septum deviations removed with other obstructions which may exist. How common these septal deviations are, may be judged when we read that out of 4,000 cases examined in one of our hospitals in one year there were 3,823 septal deformities, most of them being deviations. Deviations of the septum are the peculiar characteristic of the Caucasian race. It is estimated that about 30% of white men have septal deviations and they are more often to the left than to the right.

The nasal septum is made up of the triangular cartilage, the septal plate of the ethmoid, the vomer and the intermaxillary ridge. In general when we speak of the deviated septum we mean one which is pathological or obstructive. Deviations of the septum may be classed under two heads, the bowed (concave on one side and convex on the other), which is most often found associated with high arched palates, and the angular, where there has probably been more force applied, fracturing the cartilage or bone. In some cases the septum cartilage or bone is divided by fibrous tissue and there is often found a large amount of fibrous tissue around the incisor crest and maxillary spine.



Septal deviations are usually due to some form of traumatism which may have occurred early in life, rarely before the fifth year, and it may increase as the septum develops. Deviations are more frequent in men than in women, on account of the sports indulged in early life. Mouth breathing may also be a cause, and, as remarked before, bowed deviations are the common result of high-arched palates.

Submucous resection is done with the aid of a reflected light. The instruments used are a speculum, small scalpel, a combination curette elevator. Ballinger swivel knife, punch forceps, small chisel and a mallet. The patient is seated, the nose cleansed and anesthetized and rendered nearly bloodless by packing with cotton saturated with a solution composed of about equal parts of cocaine 10% and epinephrin chloride, 1/1000. A small piece of cotton thoroughly saturated with the above solution is gently inserted in the region of the superior turbinate or the highest part of the nose. The next cotton application is a little larger and inserted above the lower turbinate and the third application is much larger and longer and is inserted below the lower turbinate well back toward the pharynx. After remaining in position for about twenty minutes the cotton is removed and a vertical incision is made anterior to the white line. The knife is inserted about one-third of an inch, in most cases from the top of the nose, and brought downward to the floor and the outside of the nose. In the nose, incision is made through the mucous membrane and the perichondrium but not into the cartilage. We now elevate the mucous membrane starting at the highest angle of the incision, pushing the elevator gently backward, downward and bringing the elevator forward. In most cases we are able to separate the mucous membrane from the cartilage from behind forward and then scraping through the cartilage, separating the mucous membrane from the other side. The cartilage is now removed with a Ballinger knife or forceps. If the deformity is not corrected it is advisable to insert a cutting forceps and bite through the junction of the perpendicular plate of the ethmoid with the cartilage; if we are careful at this point there is practically no danger of causing a fracture of the cribriform plate. We now remove the perpendicular plate of the ethmoid and the part of the vomer that may cause obstruction. The incisor crest as a rule will cause more or less obstruction and it is surrounded by a large amount of fibrous tissue. This tissue and the adherent membrane may be easily separated with a sharp knife, if one will remember to keep the edge of the knife on the incisor crest. The incisor crest is easily removed with a chisel and mallet. It should be remembered that the incisor crest extends forward and if the chisel is inserted well down on the crest and driven upward it will separate with very little force. After removing the incisor crest one will be surprised at the large opening produced in the nose between the membranes. The intermaxillary ridge as a rule is very thin below the junction of the triangular cartilage, and if the chisel is inserted at the thin part of the bone, with one or two little taps we are able to fracture the bone as a rule for a considerable distance posteriorly and it is easily removed with a curette or forceps. The membrane is now divided at its outer angle for a distance of about one-third of an inch and replaced on the septum.

The nares are then packed with petrolatum gauze which is removed at the end of twenty-four hours. A few crusts will form which are removed as a rule once a day. There is little reaction and the patient is generally able to return to his occupation 24 hours after the packing has been removed.

The advantage of the submucous operation over other operations for deflection are:

1. That no mucous membrane has been destroyed.
2. That spurs and deflections have been entirely removed with the thickening of the septum.
3. That the ridge of cartilage which is wedged in between the lateral cartilage has not been interfered with, and there is absolutely no danger of a falling or saddle-back nose.

FRONTAL SINUS DRAINAGE.

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In order to obtain some idea of the kinds of frontal sinusitis cases that are met with, letters with the following three questions were sent to a group of representative nose and throat specialists, the attached figures being the averages of the answers:

1. What percentage of your frontal sinusitis cases are acute? Answer, 52.5%.
2. What percentage are chronic? Answer, 47.5%.
3. What percentage of acute cases become chronic? Answer, 3%.

All the answers received tallied closely, so that they must be regarded as reliable. The question, therefore, arises, "Where do all the chronic cases come from?' The answer is probably found in one of the following explanations:

1. The acute symptoms were so mild or of so short duration that the patients disregarded them and did not seek advice until chronic symptoms had forced them to do so.
2. The acute cases that did seek advice were treated only for the acute symptoms, of which pain is the most prominent, and when these were relieved the patients drifted away.

The treatment of frontal sinusitis varies between the extremes of conservatism and radicalism. On the one hand, cases of acute frontal sinusitis are treated by the use of cocaine and epinephrin and the removal of the middle turbinate to open the fronto-nasal duct. On the other hand, we have chronic cases treated by external and internal operations, with the exenteration of neighboring cells and the destruction of large areas of nasal mucosa. There seems to be no middle road.

When we consider that an inflammation of a nasal sinus is, pathologically, just like an inflammation of a mucous membrane elsewhere, like an otitis media, for example, we receive a clue as to the necessity for continuous drainage of the sinus over a sufficiently long period to prevent the insidious onset of chronic sinusitis. We must impress on our patients the need for continuing treatment long after the pain and tenderness have subsided.

INTRA-NASAL DRAINAGE OF THE FRONTAL SINUS THROUGH THE NATURAL OPENING.

The three factors that prevent proper drainage in frontal sinusitis are, in the order of their frequency, first, the swelling of the nasal mucosa; second, hypertrophied middle turbinates; and third, polyps. The nasal mucous membrane, containing much erectile tissue, is subject to physiological engorgement many times during the day. When there is the added stimulus of an infection, the engorgement becomes practically constant.

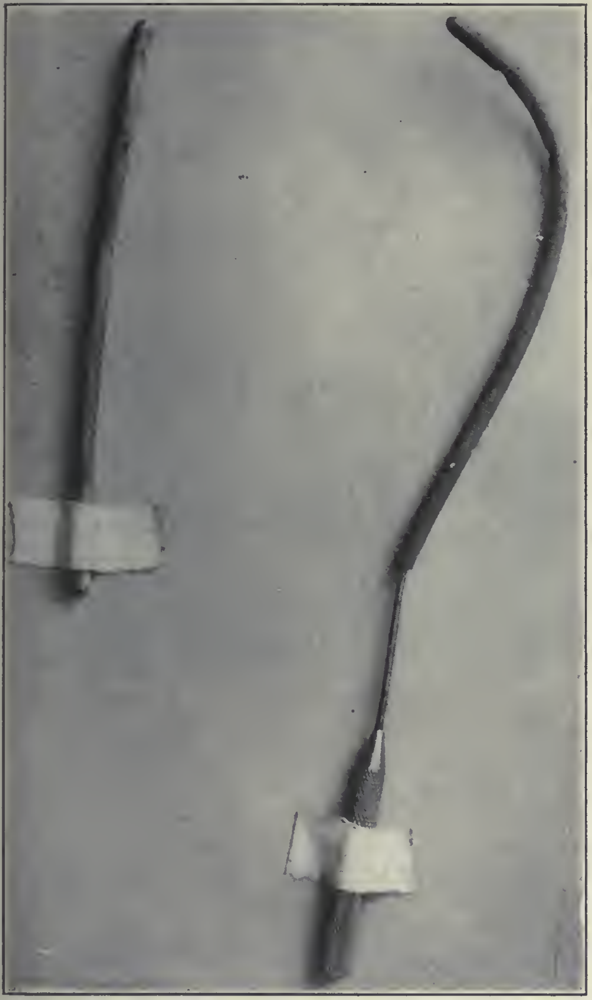

Fig. 1—Instruments used for draining frontal sinus.

When it is considered that the fronto-nasal opening is so small that it often fails to admit the smallest probe it can readily be seen how completely it can be blocked by the swollen mucous membrane.

Adrenalin and cocaine shrink the mucous membrane by direct action on the walls of the arterioles. On normal mucous membrane their action is prompt and effective. In inflammatory conditions, however, there is exudation of cells and serum about the vessels which prevents the approach of the epinephrin and makes its action slow and incomplete or prevents it altogether. When it is considered, furthermore, that the fronto-nasal canal is about one-half inch to three-quarters inch in length, it becomes apparent how futile, in some cases, is the use of epinephrin for establishing drainage.

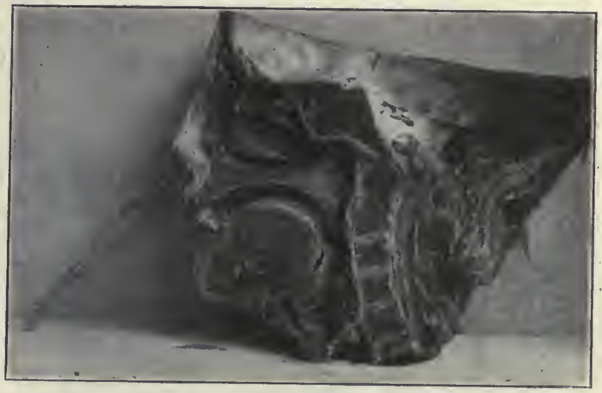

Fig. 2—Specimen showing drainage tube on probe introduced into frontal sinus.

Obstructing turbinates and polyps, must of course, be removed.

The method to be described is meant for use in cases where the natural fronto-nasal opening is intact and where no operations more extensive than the removal of polyps or of the anterior tip of the middle turbinate have been performed. Briefly, it consists in the introduction into the frontal sinus, through the natural opening, of rubber or fabric drainage tubes and their continuous retention in the nose during the course of the sinusitis.

The instruments used are (1) a slender frontal sinus probe, and (2) rubber, silk or linen catheters of sizes 4 to 10 French. The largest catheter that the fronto-nasal opening of a particular case will admit is used in that case. The ordinary urethral catheters can be used for this purpose cut down to three and one-half inches from the tip and with perforations punched in the sides at intervals of one-half inch.

The technic employed is as follows:

The nasal mucosa is anesthetized and the frontal sinus is probed. The probe is first used by itself to determine the size and the direction of the fronto-nasal opening. If the opening is obstructed by the middle turbinate this must be removed. The size and direction of the opening having been ascertained, the probe is then pushed through the lumen of the proper sized catheter to its end. The probe, encased in the catheter, is then reinserted in the frontal sinus. The catheter is then held loosely by the fingers of one hand and the probe is gently withdrawn by the other, leaving the catheter *in situ*. The catheter is then grasped near its entrance into the opening with a nasal forceps and pushed further into the frontal sinus as far as it will easily go. Being flexible it will pass over projections that will block a metal catheter. The lower end of the catheter is then cut off intranasally, so that the remaining portion rests on the floor of the nose. At the end of this procedure there is then left a tube about two and one-half inches in length, extending from the floor of the nose up into the frontal sinus. This tube is left in place for one to two days, when it is removed and replaced by another. Before the tube is replaced the sinus can be irrigated.

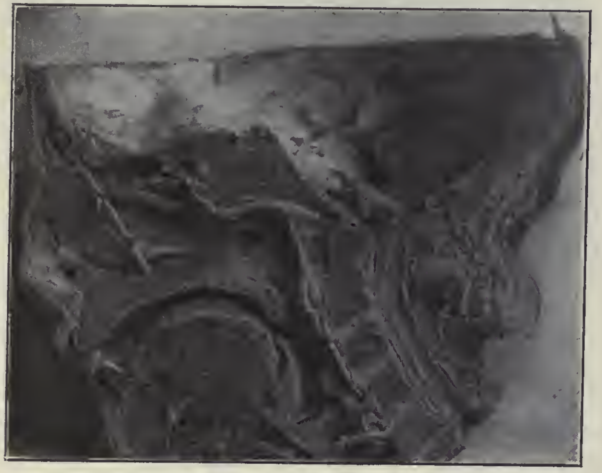
Fig. 3—Drainage tube in position in frontal sinus.

The catheter is cut three and one-half inches long to begin with because its lower end will then project from the nose after its tip is in the sinus and furnish a place for holding it when the carrying probe is withdrawn. If linen or silk catheters are used, they should be dipped into hot water before being inserted into the nose, in order to make them softer.

This method of treating frontal sinus disease has the advantages that (1) there is a minimal destruction of nasal mucosa, (2) it resists the encroachment of the swollen mucous membrane on the lumen of the fronto-nasal opening and (3) it prevents blocking of the opening by small polyps. It is in accord with the principles of surgery in that it maintains continuous drainage of the frontal sinus.

The case of frontal sinusitis which led to the development of this method and which illustrated the adequacy of the drainage obtained was the following:

G. R., aged 38, came to me complaining of frequent "head colds," much purulent discharge from the nose and difficult nasal respiration. In the right naris there was polypoid degeneration of the middle turbinate, with polyps filling the upper half of the naris. In the left naris there was hypertrophy of both turbinates, but no polyps. I removed the polyps from the right side of the nose. Two days afterwards the patient developed extreme pain over the right eyebrow, with chills and fever and profuse discharge into the middle meatus. From June 23rd to July 21st, the treatment consisted of free use of epinephrin with nasal douches, suction and sinus irrigations. Relief was only intermittent and on July 21st, I had about decided to open the frontal sinus intra-nasally, when I hit on the plan of introducing a rubber tube into the sinus through the natural opening and leaving it in place for continuous drainage. This was done and pus could be seen pouring from the openings in the tube. The relief from pain was almost instantaneous and complete. The tube was replaced every second day for two weeks until a thin serous discharge had replaced the pus, when it was removed. The frontal tenderness was completely gone and the discharge from the nose was less than it had ever been in the memory of the patient.

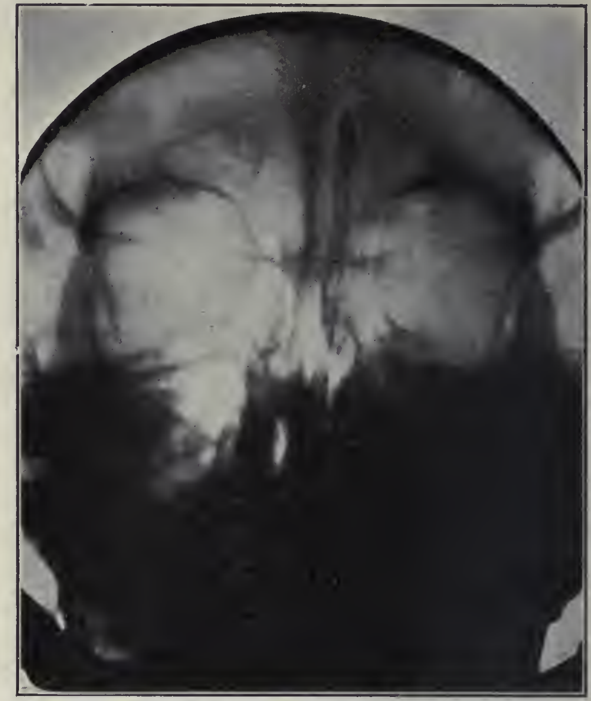
Fig. 4—Case of frontal sinusitis with drainage tube in frontal sinus.

Case II.—Mrs. E. B.—39 years—had had a frontal sinusitis seven years ago. Present illness dated back ten days. Complained of very severe pain over left eyebrow, with chills, fever and purulent discharge from left nostril. First seen 1/5/20 treated with adrenalin. Two days later anterior tip of middle turbinate was removed. Treated for four days with adrenalin sprays, but pain increased. On 1/11/20 small polyps were seen protruding from the naso-frontal opening. Tube was inserted into frontal sinus, with marked lessening of pain and much increase of the discharge. Was treated with the tube for one week, when pain was completely gone and discharge had changed from pus to thin serum. Polyps were touched with 12½% $AgNO_3$ and disappeared from view in three weeks. Her symptoms disappeared and she stopped treatment.

CASE III.—Miss D. M., 23, suffered for twelve years with very profuse purulent discharge from the nose, more marked on the right side, and severe frontal and vertex headaches. Six months before the right middle turbinate had been removed without relief. Examination showed great thickening of the tissues in the vault of the nose and profuse discharge. A rubber tube was put into the right frontal sinus and a silk one in the left. The tubes stay in place about two days, then fall out. They give great relief for the headaches but attendance for treatment is irregular and no progress has been made in relieving the discharge.

DISEASES OF THE EAR, NOSE AND THROAT OBSERVED IN ASIA MINOR.

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These observations are based on visits of inspection to and operations performed in the hospitals and orphanages under the control of the Near East Relief in Anatolia and cover the district from the Black Sea on the north to Mesopotamia on the south and from Constantinople nearly to the Persian Border. They have relation for the most part to refugee populations seeking help from missionary or Near East Relief stations and represent the conditions of those who survived under years of hardship due to deportation from their homes and to war and after-war conditions.

The patients seen were mostly children. There were some women but relatively few men since most of the men were killed during the deportations and many of the women lost their lives from exposure to hardships of various kinds. In the main, the children are a hardy group, the weak ones having died and, if rescued before starvation has too far affected them, they rapidly recover. They suffer chiefly from dilated stomachs due to the bad coarse diet of the last few years, skin diseases, especially scabies and favus, and eye diseases such as trachoma and staphyloma and the severe forms of conjunctivitis.

Throughout all of Asia Minor the infant mortality is high. This is due to bad housing and living conditions, and the lack of proper diet for young children. There is almost entire absence of dairying and the supply of milk is always insufficient, while the hygienic conditions surrounding child life are especially bad during the summer months. The result is that the period from weaning to about three years of age is very trying to children and great numbers of them die of diarrheal diseases and from malaria and other insect borne diseases. This mortality becomes greater as the warmer regions toward Mesopotamia are reached and may in general be stated to be as high as fifty per cent. The result of this high mortality is that the children who do survive are quite hardy and resistant.

The Turkish children are in better physical condition and better nourished than are those of the subject races, namely, the Armenians, Syrians, and Greeks and, with the exception of a district in Russian Armenia, they suffered relatively little from war conditions.

The purely respiratory diseases and ear diseases are, compared with eye and skin diseases, relatively infrequent. I examined hundreds of children in different orphanages and found them to be almost universally nose breathers, nor do they suffer much from diseased tonsils. During more than half of the year they live out of doors and as the climate of the greater portion of Asia Minor after leaving the sea coast is dry, catarrhal affections of the nose and accessory sinuses and adenoids occur less often than with us. Most of the tonsil and adenoid operations which I performed were in coast towns, such as Smyrna, Constantinople, Ismid and the like. The same number of children bunched together in orphanages here in America would, I think, show more nasal trouble both as regards hypertrophied tonsils and adenoids than did those children in Asia Minor. Tuberculous osteomyelitis is very common in both child and adult but tuberculous laryngitis is not common and the cases of tuberculous osteomyelitis had, as a rule, no lung involvement.

Several operations for septal deviations were performed, but these were of no special interest. There was one laryngeal affection which was quite unique and which was met five times in places widely separated, namely, the attachment of leeches to the mucous membrane of mouth or larynx. In three cases the leech was fastened to the vocal cords with the body partly above and partly below the cord and when so fastened it is almost impossible to remove the leech. In two instances the thyroid was split sufficiently to get hold of the leech, all attempts at removal with forceps having failed. In another instance the leech was partly torn to pieces with the forceps and even then did not let go but was eventually cast off. In two cases the leech was in the naso-pharynx and from here was detached without difficulty. The reason for these leeches in the respiratory tract is found in the common habit of drinking from every wayside stream, the mouth being inserted in the waters of the stream. As these streams are often very muddy the leech is drawn into the mouth without being observed at the time.

Suppurative ethmoiditis and its affections also occurred rather rarely. I recall only one case of general pansinusitis and not many cases of polypi.

I had the opportunity of removing an enormous post-nasal fibroma from a Turkish woman. This fibroma had a rather narrow pedicle and removal was accomplished under ether without difficulty. The post-nares was packed at once and the packing kept in for two days. The bleeding was inconsiderable and after removal of the packing it ceased.

On account of the relative infrequency of adenoids suppurative otitides are not very common although they occur and when they do they have little chance of recovery as very little attention is paid to this condition. I conducted ear clinics at many places and performed some mastoid operations for chronic suppurations. Many of the suppurative cases cleared up without operation after the use of appropriate local treatment and it would seem that more of such cases would clear up in a dry climate under a local general treatment than in a moist climate. There was but little chronic deafness and little attempt was made to treat this for the medical work attempted was essentially relief.

Our Out-Patient Division treated in one month in one station, 5,818 cases among orphanage refugees; of these 2,179 were cases of skin diseases, 3,439 were cases of eye diseases, and there were 90 cases of suppurative otitis. In the hospital out-patient department the record gives 26 cases of ear, nose and throat diseases while at the same time there were 387 eye cases, these out of a total of 2,631. Eye diseases are therefore far more common and more serious in this country than those of the ear, nose and throat and any person going to the Near East as a physician should be well grounded in the external diseases of the eye.

I have no doubt that careful examination would probably have revealed more cases of suppurative ear disease than were brought to my attention. With the great demand made on physicians in these relief stations, the ear is apt to be slighted, unless one has special interest in it and there are good light and proper facilities for examination.

SOME NOTES ON THE TECHNICS OF TONSILLECTOMY.

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There are probably but few subjects in the whole field of surgery about which so much has been written as the tonsil, and the end is yet far from being reached. The very existence of such a great mass of literature is the surest indication that no specific has been found, and that tonsil surgery is still a long way from arrival at a satisfactory degree of standardization. Tonsil operating has long been a fair field for any one holding a medical degree, with the inevitable results so familiar to all of us.

This condition of affairs has fostered the idea in the minds of most laymen, and also, unfortunately, of a large number of physicians, that the removal of tonsils is a procedure of minor importance, not worthy of serious consideration. However, there is apparently a growing tendency towards a more enlightened view of the matter and with increasing knowledge on the part of the public, there will be a more insistent demand for better work.

Beginning with the finger enucleation described by Celsus, almost two thousand years ago, which with very little alteration is still in use today, there have been evolved countless methods and modifications of methods for the removal, or partial removal of tonsils. Some of these have stood the test of experience and more of them have been discarded and forgotten.

Notwithstanding the contrary view of most European laryngologists, it seems to be clearly established that the aim of whatever method of operating is chosen as best suited to the individual operator, should be the complete removal of the structure and its capsule, with the least possible trauma to the neighboring tissues. The advocates of tonsillotomy, and there are still many, have not established their case and the rationale of leaving in the throat the stump of a tonsil, considered sufficiently diseased to require surgical interference is difficult of explanation. The advocates of complete enucleation can be accused of radicalism no more than can the abdominal surgeon for the removal of the entire appendix, when the most apparent lesion occurs in its tip.

With this view accepted, as it is by the great majority of operators in this country, there remains the selection of the particular technic which best accomplishes the purpose, and there are two general methods to be considered: the dissecting and non-dissecting.

Every surgeon who attempts the removal of tonsils should have developed some form of dissection best suited to his individual use. Although the recent development of the non-dissecting technic has provided the better method in a large majority of cases and is indispensable when the former cannot be used, dissection is applicable to every case that comes to operation.

There are many forms of dissection in general use, the century-old finger method of Celsus unfortunately being one of them, despite the excessive trauma produced.

The following is a description of the method used by the writer: The tonsil is firmly grasped with the forceps, pulled inward as far as possible without excessive tension and then rotated posteriorly. This puts the anterior pillar on the stretch. A sharp knife is used to split the mucous membranes and the upper third of the anterior pillar, close to the tonsil. This cut is just through the mucous membrane and about one-half inch long. The tension under which the tonsil is held causes a gaping of this cut, showing the white capsule beneath.

A Lathrop knife, with the small blunt hook at the end, is introduced through the cut and the mucous membrane incised close to the tonsil down the length of the anterior pillar. The same knife is reintroduced and the tonsil now rotated forward. This exposes the posterior pillar and the knife is passed upward, backward and downward, care being taken to closely hug the tonsil. This completely separates the mucous membrane attachment and throws the superior pole of the tonsil out of its bed.

The forceps are now removed from the main body of the tonsil and attached to the evulsed upper lobe. A tightly made gauze sponge, the size of a small marble, is placed in a long hemostat and with this the muscular wall at the base of the fossa is separated from the tonsil, from above downward. The muscle is separated from the tonsil rather than vice versa, no attempt being made to pull the tonsil from the wall. Only sufficient traction is made on the tonsillar forceps to counteract the pressure of the sponge against the muscle, no pressure with the sponge being made against the tonsillar capsule. Oftentimes the whole tonsil is removed in this way, but it is sometimes desirable to separate the inferior pole with a snare.

There is usually but little bleeding and this can be easily controlled by simply detaching the small sponge, used for the separation, and leaving it in the fossa while the operation is continued with another one.

By adhering closely to the retracted tonsil while making the primary mucous membrane incision, there is no subsequent injury done to the pillars and the gauze separation in the bed of the fossa is not productive of undue traumatism.

This technic can be used in all cases, but it is more difficult and cumbersome, as are all forms of dissection, than are some of the more recently developed non-dissecting methods. In the great majority of instances, well over ninety per cent. of adults and children, the non-dissecting method is both possible and more desirable.

The two more popular methods in this latter class are those developed by Sluder, using the guillotine, and by Beck with the fenestrated snare. Both, in proper hands, accomplish excellent results, but the writer has found the Beck snare to be the better for his purposes. While the methods are fundamentally very similar there is one essential difference in the working of the two instruments. The guillotine acts from before backward and the snare from behind forward.

Of the two pillars, the posterior is the more important from a fundamental standpoint and the one more worthy of protection. In using the guillotine, the blade is pushed tightly home from in front and fails to completely sever the mucous membrane attached to the tonsil along the posterior pillar. The final motion in the operation is a twist which frequently tears the unsevered mucous membrane, denuding more or less of the posterior pillar, leaving the muscle base with consequent excessive scarring. This does not happen at the hands of all operators, but it is, nevertheless, a frequent occurrence.

With the Beck instrument, the tonsil is engaged within the ring in the same manner as with the Sluder, but the separating of the tonsil from its attachments is begun from behind. Before any cutting is done, the wire is tightly pulled into the deepest part of the sulcus between the posterior pillar and the tonsil, and after the tonsil is cut the pillar will be found to be covered with uninjured mucous membrane which extends well over the pillar to a considerable depth within the fossa.

Each instrument does its work well, with a minimum of traumatism. Each leaves a smooth tonsil base, the amount of bleeding in each case is about the same, but despite the greater complication of the Beck instrument, it gives, in most cases, the better end-results by affording greater protection to the posterior pillar.

Each of the foregoing methods, that is, the dissection or Beck enucleation, can be used with equal success under general or local anesthesia. There is less manipulation of the parts when the non-dissecting technic is used and it can be done more quickly than dissection, with equally satisfactory results, and it is, therefore, to be preferred when local anesthesia is used.

It is not the purpose, here, to discuss the relative merits of local and general anesthesia. The choice is left, largely, to the patient and there is an increasing number of adults who choose the local method.

This is carried out as follows: One-half hour before the operation, the patient is given a hypodermatic injection of morphine, varying from ⅛ to ¼ of a grain, with 1/150 of a grain of atropine. He is made comfortable in a wheel-chair with a high back well padded with pillows.

The pharynx, tongue and faucial regions are painted with a cotton swab moderately soaked in epinephrin solution and dipped in cocain flakes. Three applications with each of three such swabs are sufficient to effectually stop all desire to gag, even when the pharynx is forcible touched. No toxic effects have been observed in more than two hundred cases where this method has been employed.

A one-half of one per cent. solution of novocain, without epinephrin is used for the injection, about one and one-half ounce being injected in each region. A straight needle is used and all injection is done between the pillars and the tonsil, never through the anterior pillar, which is retracted by the needle and the solution injected into the sulcus. This tends to prevent subsequent edema and the formation of ecchymoses. Two points in the posterior region, two in the anterior and one in the base are injected. Both sides are anesthesized before the operation is begun and it is unnecessary to wait before removing the first tonsil longer than is required to inject the second, which is not more than one minute.

With the throat prepared in this way, the Beck enucleation can be performed painlessly. There is sometimes a mild sense of discomfort in cases where the tonsil is not easily forced through the ring, but it is not painful, nor is the tightening down of the snare uncomfortable.

There is usually but a very slight amount of bleeding and certainly the traumatism is less than any method of dissection, no matter how dexterously accomplished. In some individuals, one tonsil may be such that the Beck method can be used, while the other requires dissection. Invariably the dissected side causes the greater amount of discomfort afterward, although it may have been equally painless at the time of the operation.

Within reasonable limits, the time required to operate should not be an argument for or against any method of enucleation. The day of operating against time and getting the patient off the table with the quickest dispatch is past. More and more of general surgical principles are coming to be applied to tonsil work and it may be proper to call attention to two facts in particular.

The mouth is far from being an aseptic field, but ordinary precautions should be observed not to have additional, extraneous, infection present. Attempts to make the mouth surgically clean are useless and unnecessary, but one most important point to insist upon is that all diseased teeth shall be put in a clean condition before the operation is undertaken. This precaution will obviate some distressing cases of post-operative infection.

The greatest bugbear of the throat surgeon is hemorrhage and strangely enough it is one aspect of the work that has not received adequate attention. Much has been written and many ingenious applications devised for the arrest of secondary hemorrhage, but not enough care has been given to the prevention of this hemorrhage. Nature has been kind in stopping the bleeding in the majority of tonsillectomy patients, thus blithely left to their fate, and those who continued to bleed were regarded as an annoyance to the surgeon, called two or three hours later to stop a "secondary" hemorrhage. No abdominal surgical case is left with the slightest indication of bleeding and yet, very little importance is paid to a small persistently bleeding vessel in the tonsil fossa. In fact, the operated area is all too frequently not even inspected after the tonsil is out. This is not fair to the patient, aside from being very often a source of inconvenience to the operator.

If the operator will make pressure in the fossa immediately after the tonsil is removed, the inevitable primary bleeding will be largely checked and the patient be saved the loss of an amount varying from one to several ounces. The loss of this comparatively small amount is of little importance to a healthy adult, but it may be very serious in the case of a poorly nourished or anemic child.

A few minutes extra anesthesia is not detrimental and allows the operator plenty of time to carefully inspect the operated field and assure himself that all bleeding has stopped. Every bleeding point should be absolutely checked before the patient is removed from the table. If pressure fails to stop it after two or three minutes, tension should be tried. When this fails, one should not hesitate to ligate the point with fine, plain catgut. The placing of a fine tie around a point in the fossa is often difficult, but if the gut is first superficially anchored in the tissue, using a long handled, curved needle, it can very readily be thrown around the tip of the hemostat, grasping the bleeding point, and effectually stopping the hemorrhage This does not cause troublesome scarring when the tie is not deep. Mass ligaturing should never be used.

Observation of these few points and absolute insistence on a dry field before considering the operation over, requires a few minutes longer at the time, but is of great benefit to the patient, both by conserving all blood possible and lessening the amount of blood swallowed, and thus decreasing the severity of the after nausea and hastening convalescence.

Although tonsillectomy may not be rightly classed as a major operation, it is far from being a simple matter and considerable time and experience are required for the development of a satisfactory technic. It should never be attempted, except by a specialist.

Proper attention to ordinary surgical principles, particularly as regards asepsis and hemorrhage, requires but little extra effort on the part of the operator. The five-minute operation of a few years ago has gradually come to be nearer twenty and the resulting beneficial results more than justify the increased expenditure of time. The cases of "secondary" hemorrhage, which are really, in most cases, persistent primary bleeding, not observed at operation, have been markedly lessened by this extra care, to the undoubted benefit of the patient and the satisfaction of the surgeon.

347 Monroe Avenue.

Tonsillectomy.

Some surgeons after separating the tonsil from the pillars apply the snare, tighten it, and proceed with their work upon the other tonsil, then both tonsils are clipped off at the same time. All is well that ends well. But should there happen to be an anomaly in the tonsillar blood supply, or should the patient happen to be a bleeder it would complicate matters quite seriously. Is it not much safer to remove one tonsil and then the other? For as soon as one tonsil is enucleated we can get a fair idea if we are faced with any danger. We would notice the amount of blood lost, we would also notice the coagulation time, and when everything is satisfactory with the first tonsil then to proceed with the enucleation of the second tonsil.—Max Lubman in *The Medical Times*.

ENDOSCOPY OF THE LARYNX, BRONCHI AND ESOPHAGUS.

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Introduction. Endoscopy is a very specialized procedure, of great value in the examination and treatment of diseases of the larynx, lower air passages and esophagus. The opportunity it affords for precise and accurate examination and operation is unexcelled, when compared with the indirect methods, which are very limited in their fields. In the majority of cases operated by the older methods, exceptions granted, they cannot be as satisfactorily done as by endoscopic procedure.

Direct methods require practice, but every one of these procedures and manipulations can be mastered. In practised hands endoscopy is not formidable. More frequent examinations of the esophagus and upper air passages by endoscopic methods will assuredly aid all who wish to arrive at an early and exact diagnosis in pathological conditions of these areas. Sight is our most important sense and our most important aid in arriving at a diagnosis.

In the majority of children an examination of the larynx and esophagus cannot be done by the use of the mirror and in order to properly study these parts we do so by the use of various spatulae and tubes used in endoscopy.

General Considerations. 1. Prolonged examination by these methods is poor technique, for there is always the danger of inducing edema of the parts, particularly should the operator have any difficulty in the procedure.

Gagging invariably means that the operator is pressing the larynx forward and that the beak of the instrument is in the entrance of the esophagus. This may be corrected and overcome by withdrawing the instrument a short distance and lifting the handle, when the beak of the spatula will drop into the entrance of the larynx.

2. The smaller the tube, the easier for the patient —but, of course, the field is correspondingly contracted and the general view and the relationship of the adjacent parts cannot be seen at the same time. However, for examination the smaller tubes are to be preferred, while for operative procedure the largest tube that can be used consistently, is to be employed.

3. If the proximal lighting is used, that is the Bruning type of instrument, the light should be properly focussed before introduction, as illumination is very much increased by correct adjustment. The distally illuminated instruments, that is the

Jackson type, should be brought to the proper degree of illumination before introduction.

4. The use of rolled gauze or tampons, as suggested by Yankauer, for mopping and cleaning the field, is of decided advantage. The use of cotton rolled on applicators is not to be recommended, unless one uses cotton rolled on wooden sticks and cemented to the wood by the use ofcollodion. Also, the use of suction greatly facilitates removal of secretions, etc., and gives us a clear field for inspection and operation.

5. Instruments, biting and cutting type, should be introduced within the tubes closed; they should also be warm. Introduced closed they take up less space and the eye can follow the end of the instrument more accurately. If possible, instruments should be introduced diagonally and not in the line of direct vision.

6. In an examination of the esophagus, particularly the upper part, the esophageal speculum of Jackson is very useful in adults, while in children the type known as the Johnson modification of Jackson's original laryngoscope is to be used. By the upper part of the esophagus is meant that portion above and in the neighborhood of the crico-pharyngeal constriction. For examination of the esophagus below the crico-pharyngeal constriction the ballooning instruments of Mosher are to be preferred.

7. It should be axiomatic with the endoscopist never to attempt to pass his instrument beyond an obstruction in a tube cavity, particularly should there be any suggestion of malignancy.

Anesthesia. In a great number of cases and as the operators' experience with these methods improve, local or no anesthesia will be employed; while, the majority of all esophageal cases can be examined without any anesthesia. In children, particularly the very young, no anesthesia is to be used either for laryngeal or bronchial examination. Of course there are certain types of cases, both in children and in adults, where it is absolutely necessary to use an anesthetic. In these cases a general anesthesia (ether to be preferred) is used.

When employing local anesthesia, begin by anesthetizing the tongue, dorsum and root; then make one application to the epipharynx and pillars of the pharynx; wait a few moments, then introduce the spatulae to be employed and cocainize by direct vision both pyriform fossa and laryngo-pharynx; next make an application to the larynx itself, and within a few moments follow with two or three more applications until the parts are insensitive. Holding the applicator for a few seconds against the vocal cords will usually produce sufficient anesthesia to make a thorough examination of the larynx.

If a bronchoscopy is contemplated a few drops of cocaine, two or three, may be installed within the trachea. If a general anesthesia is used, and the operation is on the larynx, just before the commencement of the operation, cocainize, by holding an applicator against the vocal cords for a few seconds; 10% cocaine is used in these procedures, rarely 20%.

Rectal (ether-oil) anesthesia, as suggested by Gwathmey, may be employed, but in the writer's experience the use of ether by the usual method has always been satisfactory.

The use of epinephrin where indicated aids materially. In certain types of cases, in which local anesthesia is employed, a hypodermatic injection of morphine and atropine before any instrumentation, materially helps in the smoothness with which the manipulation may be carried out.

Laryngoscopy. With the patient in the recumbent position, the head extended and the occiput resting on the table, the warmed laryngoscope is introduced within the mouth and the dorsum of the tongue pressed upward, until the beak of the instrument approaches the region of the epiglottis. The beak then is slightly lowered, by the tilting of the handle of the laryngoscope, and the epiglottis is caught, as it were, by the raising of the beak. The introitus of the larynx is now visible. Examination of the larynx is now proceeded with in the usual manner. The success of this manipulation depends on the steadiness and continued pressure on the parts. The lines of force should be so directed that they expend themselves at the beak of the instrument. It is poor technique to use the upper teeth as a fulcrum in this manipulation, and the instruments should be controlled from the handle. With either the proximal or distal lighting instruments at least one inch beyond the beak of the instrument can be easily inspected. Should the patient have very prominent teeth, the head may be slightly turned to one side or the other and the instrument introduced over the molar teeth. The side of the epiglottis is picked up and then the instrument is slightly swung toward the median line.

For operative work on the larynx, the Killian suspension laryngoscope, modified by Lynch, is to be preferred. The larger field of operation and the use of both hands, are the advantages that this apparatus has over any of the tube instruments. In the introduction of this instrument, it should be passed in exactly the same manner as the laryngoscope, that is, the beak of the instrument should always be under the guidance of the eye.

Bronchoscopy. The Jackson type of bronchoscopes are used. The smaller tubes are to be preferred because less traumatizing of the parts takes place. Using the Jackson slide spatula or the laryngeal spatula of Mosher, the larynx is inspected and the vocal cords identified. If the laryngeal spatula of Jackson is used, as soon as the beak of the bronchoscope enters the larynx it is turned to one side and the assistant removes the slide. If the Mosher instrument is used, of course, that is unnecessary, the laryngeal speculum simply being withdrawn. Keeping the eye on the beak of the bronchoscope it is further introduced into the trachea and the carina trachea identified. The bronchi are then inspected and whatever necessary procedure intended, intrabronchially, is carried out. Within the trachea, or bronchi, suction, using the narrow tube of Jackson, is very useful. Sponge pumping as suggested by Jackson in certain types of cases is also very useful. If there is considerable irritation and coughing when in the region of the carina, an application of cocaine will materially assist in making the examination easier. Secretions and varying pathological conditions are noted. The significance of secretions in the tube cavity is to be noted, for normally none is present.

Foreign bodies within the air passages and esophagus are all individual and separate problems and are to be studied accordingly.

Esophagoscopy. The Jackson esophageal speculum in adults and the laryngeal speculum of Jackson-Johnson in children, are used in the upper esophagus. The position of the patient's head is somewhat different than for a laryngoscopy or a bronchoscopy. The head should be steadied by an assistant who stands on either side of the patient, facing the operator. The head is over the edge of the table and is not extended. Introducing the speculum, the beak enters either pyriform sinus, passing down behind the larynx, and then the handle is swung to the median line. The crico-pharyngeal constriction is identified as a hump of tissue entering the lumen of the lower portion of the esophageal speculum.

Suction is of more use in this locality than mopping with sponges. Forward pressure on the beak of the instrument will usually dilate the crico-pharyngeal constriction, and the lumen of the esophagus for several inches comes into view. For examination of the lower esophagus the ballooning instruments of Mosher are employed. With this type of instrument the secretions are pressed away from the beak of the instrument, while the parts are inspected. In the introduction of the esophagoscope the high-low position of Jackson, which is classical, is employed. It is necessary to continually bear in mind in the examination or instrumentation of the esophagus, the varying diameters at the different levels. This is of greatest importance, for serious and even fatal injuries have been known to take place when no regard has been paid to these anatomical conditions.

Conclusions. In order to perfect one's technique in endoscopy, continued practice is essential. An occasional endoscopist can do great damage to the parts and even cause death.

The marked difference of the laryngeal picture between the direct and the indirect method is such that one unaccustomed to this newer method can hardly appreciate the true condition, either normal or otherwise, that is present. While the mechanical manipulations of the various instruments and apparatus require practice, the eye must be repeatedly viewing the internal structures of the larynx, trachea or esophagus in order to appreciate the findings, normal or pathological. Parenthentically, the contention of the older laryngologists that the indirect method has become a lost art is hardly true for this method will always be practiced.

The common notion regarding endoscopy is to intimately associate it with the removal of foreign bodies. While this is certainly a brilliant and spectacular procedure, still the use of endoscopy, other than operative, as a means of diagnosing and treating diseases of the upper air passages and esophagus is assuredly an advance in medical progress.

STRICTURE OF THE ESOPHAGUS.

It is now universally accepted that instrumentation of the esophagus should only be done by employing waxed silk thread. The patient is directed to swallow about 12 inches and gradually small amounts until about two yards have been swallowed by bed-time. In the morning, two more yards are swallowed, and by the time instrumentation is undertaken, the thread is well down in the intestinal tract. It is always advisable to wash out the esophageal pouch before introducing the thread or failure to pass through the stricture will result. The Plummer hydrostatic dilator is then introduced over the thread with the patient sitting in a straight back chair. After introduction to the desired point, a pressure of 10 to 12 pounds is carried for 3 to 5 minutes, and the dilator withdrawn.—CHARLES G. LUCAS in the *Mississippi Valley Medical Journal.*

SINUS THROMBOSIS ACCOMPANYING MIDDLE EAR INFECTIONS.

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The discussion of sinus thrombosis embraces a wide field. The subject involves many questions, of vital importance to the patient, and of absorbing interest to both clinician and surgeon.

The correlation of the pathology with the clinical findings presents one of those interesting phases of medicine wherein it is again demonstrated that to specialize properly, and adequately to treat the local situation, there is required not only an intimate knowledge of the anatomy of the structures affected, but also a thorough acquaintance with the interference of function entailed by the lesion, and all this summarized by a clinical experience which permits a prompt recognition of bedside factors and a correct interpretation of each element in the clinical picture. Only when the correlation of all the elements is correctly comprehended does the surgeon move with that assurance of good results which has given the treatment of sinus thrombosis its deservedly well-grounded reputation as a life-saving measure.

The development of a thrombus in any portion of the sigmoid sinus, after the advent of an acute infection in the mastoid process, brings with it a series of symptoms which are too well known to require extended comment here. The clinical picture of a sepsis, continuing after the evisceration of the purulency in the mastoid process—usually after a lapse of time in which the temperature has been non-septic in type—and then giving the characteristic up and down curve, accompanied by chills and vomiting, is easily recognized, and is usually accorded the grave significance that it warrants. When such a clinical manifestation gives, in addition, a positive blood culture, no doubt is usually entertained as to diagnosis. Often too, in the absence of chills or vomiting, the septic nature of the lesion and a positive blood culture are sufficient to establish the diagnosis. Such cases are designated in current text-books as *typical* cases, and observers report cases which show variations from such classical clinical pictures as *atypical* cases.

Furthermore, the pathology of sinus thrombosis is well comprehended. The variety of lesions presented, the initial involvement of the perisinal area, the eventual inflammation of the vein-wall, the mechanics of the development of the mural thrombus, —all these pathologic factors have been stressed and are understood. The evolution of the thrombus, its degeneration, and the dangers it entails by starting septic foci in distant body parts through lodgment of particles separated from it, are also accorded general recognition. It might be added that the development of thrombi within the sinus, leaving the vein-wall normal in macroscopic appearance, has so often been noted in current reports of cases as to have come to be considered as placing such findings in the classical and typical groups.

Finally, the local anatomical construction, the anastomosing venous channels, the dehiscences in the bony frame which permit the direct infection of the venous blood channels by purulent material in the tympanic cavity, have been reported and are also accepted facts. In short, upon the pathology and the symptomatology of the various classes of sinus thrombosis there exists a literature rich in study and competent observation which it is not the writer's intention to either repeat or paraphrase.

That which is not stressed in the text-books nor emphasized in reports is the correlation of the symptomatology and the lesion which presents itself with the given clinical picture.

When this is done, and the findings thus obtained are studied with reference to the lesion which presents itself in the mastoid as part of the pathologic process, then there are won data which modify our views on the whole question of sinus thrombosis, give a more detailed evolution of the pathologic process, and, from the clinician's standpoint, a better understanding of the disease and its treatment. It is to emphasize this aspect of the topic that this paper is presented.

This study is based upon observations made in thirty-seven cases of sinus thrombosis* upon which the writer operated. Of these, one followed a fracture of the skull through the mastoidal area. In six cases there had been a chronic mastoiditis for a considerable period of time antedating the appearance of the patient under the writer's observation, with an eventual acute infection superimposing itself upon this old lesion. In three of the older histories, no record is made of the type of mastoidal lesion which stands in etiologic relation to the thrombosis in the given cases, and therefore, for the purpose of the argument which follows, these three cases are deducted.

Finally, two cases are included in this study, both of which presented anatomical abnormalities of the mastoid process. There was no cell structure in the mastoid process. The sigmoid sinus and cerebellum were found immediately under the cortex, and the sinus was diseased by direct contiguity just as it is in primary bulb thrombosis, from direct contiguity with the tympanic cavity. These two cases have been reported in detail elsewhere,* but because of the possibility of meeting such cases, a brief note may not be amiss. The middle ear of these cases is first involved, and from the mastoid antrum, which is the only cell present, the disease reaches the bloodvessels. Clinically, this type of case rarely reaches otological supervision. The absence of pain and the moderate amount of discharge from the middle ear act to prevent supervision by the specialist, and the sudden onset of septic symptoms which soon are accompanied by local manifestations from some infarction gives rise to errors of diagnosis. The cases are thought to be understood when joint lesions or multiple tissue abscesses develop. or finally, when a septic endocarditis supervenes. As a matter of fact, these are secondary and mark the establishment of metastatic lesions from the undiscovered sinus thrombosis.

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* On March 24, 1920, before the Eye, Ear, Nose & Throat Section of the Medical Society of the State of New York, an analysis of 35 cases was presented. Since then, two cases have been under observation and have been operated upon.

Deducting the above cases, there remain twenty-five cases of acute mastoiditis in which the clinical picture, and the pathologic lesion, in the mastoid process as well as in the venous bloodvessel, were closely studied. Of these cases, the mastoid lesion was of the *coalescent* type of mastoiditis in fourteen cases, and of the *hemorrhagic* type of mastoiditis in eleven cases.

The pathological lesion in the mastoid process and the lesion in the sigmoid sinus stand in relation to each other. In the older literature, and even to-day, the opinion prevails among many otologists that the lesion in the bloodvessel constitutes a pathologic entity which is subsequent in time of development to the mastoidal lesion, and is a consequence of it. Conversely stated, the mastoiditis stands in etiologic relationship to the sinus thrombosis, and an early surgical interference on the mastoid process will prevent the development of the bloodvessel lesion. Let us examine this proposition more closely. To present an interesting analogy: Acute middle ear disease has been conceived as a separate and distinct pathologic entity, antecedent in time of development and in etiologic relationship to acute mastoiditis. From autopsy reports and radiographic studies we have come to modify this standpoint, and we now know that the entire middle ear and mastoid cavity are involved at one and the same time. The involvement in the mastoidal cells does not always (fortunately) go on to a destruction of the bony framework, and resolution sets in promptly upon the advent of adequate tympanic drainage and prevention of a stagnation or back-pressure of the purulent contents in the interior of the mastoid cells. The conception of the mastoidal infection as produced by contiguity rather than by the hematogenous route is being less strongly held. Thus, also, the infection of the larger venous channels by contiguity is less strongly held by those who closely study the development of the pathogenosis of the bloodvessel lesion.

The cases divide themselves distinctly into two groups; one, wherein contiguity and a sequence of events play a rôle, and another group, which is so distinctly the local manifestation of a general infection as to present a remarkable contrast to the first group.

Sinus thrombosis eventually developing after the onset and existence of mastoiditis for a period of time—the conception of a sequence of events—finds its most logical presentation where a coalescent type of mastoiditis is found at operation. Here it is conceivable that the progressive advance of the disease toward the sinus can be entertained, as one studies the destruction of the bony intercellular walls of the mastoid process. In cases of this type, it can also be said that the thombosis of the sinus and the clinical picture which it entails are preventable by early surgical interference upon the mastoid process. Delayed mastoid surgery, or the rapid advance of the disease, produce similar pathological findings. The sinus, when approached, is generally found attacked through its wall. The bony plate succumbs first, then the wall becomes involved, and lastly, the thrombus is formed in the vessel's interior. From this point onward, the clinical, surgical and pathologic problems are similar to the type of case about to be discussed.

The conception of a sequence of events and a later involvement of the sinus finds less ground for credence in the hemorrhagic type of mastoid lesion. Clinically this type of mastoiditis presents a septic picture from the onset of the disease. Of the eleven cases of this type, four give a very septic temperature curve even prior to the incision of the membrana tympani. Many of them had metastatic lesions in addition to the sinus thrombus, and in five of the cases, these metastases were developed so promptly as almost to coincide with the original operation on the mastoid, so that the same impression was given as if the infection had reached the more distant parts and developed simultaneously with the thrombosis. This observation, taken into consideration with the conception that the thrombus is at first firm, and only later develops a tendency to break down and throw off particles, gives added weight to the idea of a general infection having taken place in these cases, with sinus thrombosis as one of the most pronounced local manifestations of its presence.

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* Brief Consideration of Some Factors Concerned in Cases of Atypical Sinus Thrombosis, *The Laryngoscope*, March, 1915.

As we study the operative findings under the microscope, the general hemorrhagic infection becomes more evident, and one notes the numerous thrombotic vessels, which eventually lead into the sinus.

The local macroscopic appearance of the sinus wall and its covering plate gives interesting data. In the large majority of instances, the internal plate of bone covering the sinus is not destroyed, and when this is removed, the sinus wall is most often found to present a normal appearance. Where the vein wall is exposed for examination and found normal, the writer has noted that later it will sometimes present changes;—it becomes thickened, and on one occasion presented an ulcerated or an indented appearance.

From this, the conclusion is evident that, when searching for data to make a diagnosis of sinus thrombosis, no reliance is to be placed upon the macroscopic appearance of the wall of the vessel, especially in cases where the mastoiditis as found at operation was of the hemorrhagic type.

Studying the entire series of cases, regarding the appearance of the vessel wall, the following obtains:

Sinus wall normal in appearance	21
Sinus wall abnormal in appearance	15
No record made	1

Again, considering the two types of mastoiditis, the demonstration of the thrombus at operation presents data which add to the conception that we are dealing with two different pathologic entities. A clot was usually demonstrated in the coalescent type of mastoid. Clinically, there was usually an interval of time between the operation on the mastoid and the onset of the symptom-complex which ushered in the lesion in the sinus, and whether or not the diagnosis was substantiated by the establishment of a positive blood culture, the presence of the thrombus was generally demonstrable at operation.

On the other hand, the more rapid clinical development of the septic picture made surgical interference on the bloodvessel necessary earlier in the hemorrhagic type of mastoiditis; and with the positive blood culture as guide and basis for the diagnosis of septic sinus thrombosis, in six cases no thrombus was found. The most recent case of this type may serve as illustration:

A boy five years of age, following an attack of pneumonia, suddenly begins to present a very septic temperature curve, and complain of pain in his right ear. General physical examination is negative. The ear presents a bulging drum-head and mastoid tenderness, and there is edema of the eyelids on the same side (right) on the second day of his trouble. All reflexes present and normal, except of the pupils, which are contracted and do not react to light. There is some rigidity of the neck. Blood culture positive.

Operation, at Beth Israel Hospital, consists of ligation of internal jugular and opening of sigmoid sinus, including these procedures with the primary simple mastoid operation, at which a mastoiditis of the hemorrhagic type was uncovered.

Second blood culture, taken twenty-four hours after operation, is negative, and patient makes uneventful recovery.*

Here, then, like the other cases, was a septic infection which gave a hemorrhagic mastoiditis and a sinus thrombosis not demonstrable at operation, and in which all the septic symptoms promptly resolved upon ligation of the internal jugular vein and the opening and plugging off of the lateral sinus, and the blood promptly became negative to culture.

Tabulating all the cases in this study:

Clot demonstrated	29
No clot found	6
Sinus not opened**	2

Failure to discover the clot in the vein is in no way held to discredit the diagnosis of septic sinus thrombosis. This is especially so where septic symptoms are presented and a positive blood culture is obtained, and where the symptoms disappear after opening the sinus and either resecting or ligating the internal jugular vein. Often, especially in the hemorrhagic type of mastoiditis, the clot is mural, and only partly fills the lumen of the vessel, and comes away in the gush of blood which follows opening the vein. It must be recognized that the size of the clot stands in no relationship with the violence of the clinical picture. The rapid disappearance of all signs of sepsis after the successful completion of the surgery is the outstanding observation in such cases. In this series, four of the clots were in the jugular bulb, and in one of them, the sigmoid sinus end of the inferior petrosal was found clotted also.

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* This history is given only in its briefest outline. The case will be published in detail with others of a series in another paper.

** Of these two cases, one was an infant, and the symptoms disappeared after mastoidectomy. The other was a case where the thrombosis was discovered at autopsy,—an anomaly of the mastoid presenting itself. Case reported in detail in *The Laryngoscope*, March, 1915.

One case in which a well developed clot was disclosed at operation presented interesting factors. This was the only *aseptic* thrombosis upon which the writer operated. The blood in this case was not examined because the patient never gave any septic symptoms. The clot was found as an incident to an exploratory operation because of symptoms which caused competent neurologists to diagnose a cerebral abscess. Upon surgical treatment to eviscerate the clot, the symptom-complex cleared, and the patient has been well since then.*

Excepting this case, the twenty-nine which presented demonstrable clots all exhibited the classical septic symptom-complex.

The most stimulating research into these blood findings in relation to ear infections is that of Libman, and since his work the study of the blood culture findings in these cases has become common practice. It must be remarked that every sinus thrombosis at some time in its evolution presents a bacteremia, and a negative finding is understandable when it is remembered that there are many factors which may inhibit the growth of the bacteria in the culture media, due to causes located in the media. Also, one must bear in mind the fact that the test may have been made at a time in which the blood obtained from the patient has cleansed itself temporarily. Bacteria usually do not live long nor do they propagate to any great extent in the circulating blood of a patient who still possesses enough vitality to combat the general invasion. Into the finer questions involved in the finding of negative blood cultures, it is not the writer's present purpose to enter. Suffice it to emphasize that one should not allow a negative culture to prevent surgical intervention where the clinical picture indicates that surgery is necessary. A positive blood culture is always of distinct diagnostic value.

In the series of cases here discussed:

Blood culture positive	17
Blood culture negative	9
Blood culture not taken	7
Blood culture not recorded	4

The value of repeating the blood culture must be stressed. Once, the predominating organism was found to change. In the first culture, the streptococcus viridans was obtained. In the second and subsequent cultures, only the streptococcus hemolyticus appeared.

After operation on the internal jugular and evisceration of the clot, a second and a third culture are necessary occasionally before the blood is found to be negative. In the majority of instances, however, a second culture taken from twenty-four to thirty-six hours after the operation gives a negative finding where the case has been surgically treated in time. Libman* has claimed the blood clear in six hours after removal of the infecting foci. Clearing of the septic clinical picture usually follows the negative blood finding by a few days, and the temperature curve drops.

When a patient presents a double mastoiditis and subsequently develops a septic temperature curve and a positive blood culture, much will depend upon the acuteness of observation of the operating surgeon and his general knowledge of this subject to determine upon which side to interfere surgically. Manifestly, both internal jugulars cannot be ligated, and both sigmoid sinuses eliminated from the circulation. Hence, the estimation of the lesion and the exact reording of the operative findings at the mastoidectomies become very important. An inspection of the vessel walls may help, but is of doubtful value. The examination of the fundi of both eyes to determine the presence of engorged bloodvessels on one side as against normally appearing vessels on the other side is of great value. Efforts may be made to hear the bruit of the blood passing through the jugular on the affected side, by means of a stethoscope placed on each jugular, and to compare the sounds heard on both sides to determine the one in which the easier flow exists, as advocated by Voss and Körner. The writer has had occasion twice to meet this problem in the series of cases herein mentioned, and chief reliance was placed each time upon the surgical findings at the original mastoidectomy, and the side with the lesion was thus correctly located. In one case, seen in consultation, the surgical findings were enhanced by the ophthalmological, and thus the affected side located. Probably no greater problem is ever presented to otological surgeons for solution than to decide which side to select for exploration of the sinus when both sides are the seat of mastoidal infections.

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*Case published in full in *The Laryngoscope*, December, 1919. Case III.

* Personal communication.

In concluding this analysis of cases, those presenting only thrombosis and those which, in addition to the thrombus, gave additional lesions of a secondary nature, are to be considered. Here one is minded to recall that bacteria possess a selective action, and the metastatic lesions are in most cases located either in the skeletal structure,—muscles and joints, or they find lodgment in the viscera —heart, lungs or meninges.

It is to be remarked that the writer rarely observed visceral complications, or secondary infections in the heart, lungs or the meninges, and also at the same or subsequent time during the same illness of the patient, abscess formation in the muscles or joints. The converse was also true. Those patients who developed secondary abscesses in the muscles or joints almost never presented any infection of their organs also. In this statement, there is not included one neglected case, seen in the agonal stage, where a hip-joint infection and a pleural empyema were presented at the time she entered the hospital for relief of a mastoidal and sigmoid sinus infection.

Of the cases here discussed, twenty-two presented secondary lesions.

Results of Operation: Of the thirty-seven cases comprising this study, there were fifteen deaths. One died of sepsis with no clot demonstrable. One died of an undiscovered thrombus (case cited above). Of the remainder, only one presented no secondary lesion, having only sigmoid sinus thrombosis. Thirteen presented secondary lesions from which they succumbed.

Recoveries: There were twenty-two recoveries. Of these, there were fourteen who recovered from thrombosis accompanying the mastoiditis, and presenting no secondary lesions, and eight who, in addition to their mastoid and bloodvessel lesion, also presented secondary metastatic foci.

Conclusions: From the above, the conclusion is drawn that sinus thrombosis presents itself in two distinct pathologic entities:

(*a*) As a *complication* of a *coalescent* type of mastoiditis, secondary to the mastoidal infection and subsequent to it. As such, it is a preventable condition in most instances. After the clinical picture is developed and diagnostic data are presented, a clot is usually demonstrable at operation.

(*b*) As a part of the local pathologic evolution of the lesion in the region of the ear, in which the *hemorrhagic* type of mastoiditis is but part of this pathologic process, and the sinus involvement another part of the same process. The disease here more particularly affects the bloodvessels of the mastoid cells, the clinical picture is one of extreme sepsis from its onset, and often one fails to demonstrate a clot at operation. Secondary lesions are common. In this type, considered as the local manifestation of a systemic infection, sinus thrombosis is not always preventable by surgery limited to the mastoid process.

Finally, it should be more commonly recognized by the profession that type *b* exists, and that mastoidectomy is not necessarily the factor which eliminates the lesion or stops the process, which may develop even when the case is in competent hands and has been operated upon as early as the diagnosis permits.

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THE INVASION OF THE INTERNAL EAR BY TYMPANIC SUPPURATION.

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Perhaps the clearest and most comprehensive view of the pathological changes in the internal ear secondary to tympanic suppuration can be had if we follow, step by step, the progress of middle ear infections into the labyrinth. First, however, a few general considerations:

An infectious labyrinthitis can occur with either an acute or a chronic middle-ear suppuration, but chronic purulent otitis is, of course, by far the more common cause. Among the acute middle-ear infections, that associated with scarlatina ranks easily as the prime cause of labyrinthine invasion. Because of the virulence of the attacking organism, there is a rapid sloughing of the tissues of the middle ear, and often a caries of the outer labyrinthine wall. There may be a perforation of the secondary tympanic membrane or the annular ligament, the mucous membrane covering these structures having been quickly destroyed. Thus, the labyrinth becomes involved and, depending upon the extent of this invasion, is partially or wholly destroyed. Even in fulminating processes, however, such as complicate scarlatina, the pathway of the labyrinthine invasion strongly influences not only the extent of destruction within the labyrinth itself, but also the type of endocranial complication, should such occur.

When the labyrinth is invaded through its solid bony walls, it seems that the endolabyrinthine structures are better able to marshall their forces against the attack than when the infection penetrates the windows. Invasion of the labyrinth through its windows leads much more frequently to immediately fatal complications than does invasion through the bony capsule. Thus it is that a dispute has arisen regarding the most frequent pathway of labyrinthine invasion. There is no question that clinical observation shows an overwhelming predominance of fistulas in the semi-circular canal, while, on the other hand, pathological examination shows fistulas in the windows the most common pathway.

Histological examination has, further, revealed the fact that in a considerable proportion of cases of acute purulent otitis media complicated by leptomeningitis the labyrinth is the passage from the infected middle-ear to the meninges. Indeed, this is sometimes true even where there have been no typical labyrinthine symptoms. A most remarkable fact!

An inflammation of the bony labyrinthine capsule, a paralabyrinthitis, secondary to tympanic disease, is at first of necessity a circumscribed process. There may, however, be several isolated points of attack, so that, as the process progresses, there may be one or several primary fistulas eroded through the bony covering of the membranous labyrinth. The latter is not involved. As a rule, there is but a single primary fistula and its favorite site is at the point of maximum exposure of the external semi-circular canal.

A paralabyrinthitis with fistula usually follows chronic middle-ear suppuration, either with cholesteatoma or tuberculosis. It must not be forgotten, however, that a fistula may occur with an acute, or at least a subacute mastoiditis. When the middle-ear disease attacks the labyrinthine capsule, the interior of the labyrinth near that portion of capsule attacked reacts against the infection. The endosteum and the trabeculæ which hold the membranous static labyrinth in position become thickened. It is this marshalling of forces to resist invasion that, in all probability, causes the labyrinthine symptoms before the paralabyrinthitis has resulted in the formation of a definite fistula.

It has long been a matter of clinical interest that the so-called fistula reaction varies considerably in the type and direction of the resultant nystagmus. We have known, too, that the reactions against the rule have been most common in tuberculous cases. Only recently, however, has a plausible histological reason for this fact been advanced. A case with tuberculous ear and labyrinthine fistula in which the fistula reaction was against the rule came to autopsy. The histological examination of the labyrinth showed a fistula in the external semi-circular canal which was both tortuous and oblique, a rather common characteristic of tuberculous bone fistulæ elsewhere. The direction of the fistula, i. e. whether toward the ampulla or away from it, must, then, influence the direction of endolymph movement following air compression in the external auditory canal. Occlusion of the membranous canal beyond the fistula probably also plays a part.

When the middle-ear infection has penetrated the bony capsule of the labyrinth it begins to involve the membranous structures. Provided these successfully resist the invasion, the infection may, for a time, be circumscribed to a part of the labyrinth interior. Sooner or later, however, the membranous labyrinth becomes generally involved. A diffuse labyrinthitis may be secondary to a circumscribed endolabyrinthine process or it may result directly from penetration through the labyrinth windows. Such a condition has been described complicating scarlatina. It occurs, too, with the chronic otitides. The word penetrate is preferable to perforate, since it has been shown that bacteria may enter through an unruptured anular ligament or an intact secondary tympanic membrane.

Diffuse labyrinthitis may be serous or purulent. There is undoubtedly a definite histological picture identified as serous labyrinthitis but the immediate cause of this condition is, as yet, far from definitely known. Considered, on the one hand, as labyrinthitis toxica, it seems far more rational to accept the view that serous and suppurative labyrinthitis differ not in kind but merely in degree. This seems all the more plausible when we bring to mind the fact that bacteria may enter the labyrinth through an intact annular ligament or secondary tympanic membrane. True, in serous labyrinthitis, bacteria are not found within the labyrinth. Doubtless, the endolabyrinthine fluids, like other fluid tissues of the body, have bactericidal properties, and can, by this means, cope with a limited number of bacteria, but when large numbers enter, the labyrinth becomes filled with pus and the membranous structures are utterly destroyed.

Owing to the peculiar arrangement of the brain membranes in the internal auditory canal, every diffuse labyrinthitis is a circumscribed meningitis. The dura lines the bony walls of the auditory canal. The arachnoid follows the nerves into the canal. It is loosely attached to the nerves and, as the latter extend into the canal, the arachnoid separates from them, to be attached to the rim of the fundus. There is thus, surrounding the nerves, a funnel-shaped subarachnoid space communicating through the lymph sheaths around the vessels and nerves with the interior of the labyrinth. It is in this position that Politzer and Lange first described a circumscribed subarachnoid abscess at the fundus of the internal auditory canal secondary to a suppurative labyrinthitis.

After the labyrinth has become filled with pus, granulations form from the endosteum and inner surface of the bony capsule. These granulations gradually extend into the internal auditory canal and here compress, occlude and destroy the sole nutrient vessel of the bony labyrinth. It is true there are small anastomotic vessels between the circulation in the labyrinthine capsule and that of the middle-ear, but these must play an insignificant part in the nutrition of the bone, for although they have been shown chiefly in the promontory, yet when necrosis attacks the labyrinth, the cochlea is the part most frequently extruded. When the nutrition of the bony labyrinth is thus destroyed, it dies in mass and a sequesterum forms, which is surrounded by granulation tissue. Often these granulations grow on the dura not only of the posterior fossa but also of the middle fossa.

This stage, so far as the labyrinth is concerned, is "the last scene of all," for if measures are not now instituted for the relief of the suppuration, the process extends to the endocranium and there result, alone or in combination, cerebellar abscess, sinus thrombosis, meningitis and cerebral abscess.

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CHRONIC EAR SUPPURATION OF THE INTERMITTENT TYPE.

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Broadly speaking, chronic purulent otitis media may be divided into two classes or divisions. In the first class may be placed the type of running ear in which the discharge is continuous. In the second class may be placed that species of running ear in which there are periods of purulent discharge followed by periods in which the discharge ceases.

In class one (continuous discharge) the process of inflammation has usually injured the vital structures to such an extent that nature alone is unable to repair the damage. This type is usually complicated by the presence of bone necrosis or by cholesteatoma, two factors which are fatal to recovery by the processes at nature's disposal. In general, continuous chronic purulent otitis media may be considered to comprise all forms of chronic purulent diseases which have been present for a long period of time, and which fail to respond to scientific local treatment and to minor surgical methods. Furthermore, it may be truthfully stated that such cases will not be cured permanently except by radical surgical treatment, such as ossiculectomy or radical mastoid exenteration. Occasionally, a few cases will respond to some newly tried local treatment. When this occurs, it does not signify that cases of the first division can be cured by simple measures, but that certain apparently hopeless cases which are believed to be of division one, really belong to the second division.

Intermittent purulent otitis media is that variety of chronic disease of the middle ear which responds to simple medicated solutions, or to applications of nitrate of silver, trichloracetic acid, alcohol or other caustic substances. It is also the type of otitis which becomes active during or after nasal infections, tonsillitis, etc., gradually becoming dry after infection in the nose or throat has ceased.

Most text-books dealing with chronic otitis media mention the nose or throat as possible factors in disease of the ear, but nearly all of them dismiss, in a few words, the connection between the two. Such an important connection cannot be disposed of so lightly. This connection is so vital that, in many instances, success within the middle ear can be obtained only by proper diagnosis and treatment of pathological conditions within the nose or the throat. In children subject to earaches or acute infections of the middle ear, the cause is usually found to be swollen or infected adenoids. This is the simplest and most easily demonstrated example of the influence of the nose or naso-pharynx on the middle ear. In adult life the nasal septum is probably the structure which most influences the middle ear. Nature intended this partition to be relatively straight. If the septum is bent or crooked, one or both ears are very apt to suffer. Uneven air passages in the nose produce altered air currents, which upset the entire mechanism of the breathing apparatus. Such a disturbance produces inflammatory reactions in the eustachian tube, and eventually injures the cavity of the middle ear.

Acute and chronic diseases of the nasal accessory sinuses are frequent causes of ear complications. These diseases are widespread. They vary from simple acute inflammations to marked necrosis of the tissues. Affections of the sinuses of the nose almost invariably involve, to some extent, the eustachian tubes. Acute disease of the antrum, of the frontal sinus, or of the anterior ethmoid cells is not difficult to diagnose or to treat. Chronic diseases of the nasal sinuses are much more difficult. They are so frequently present that the aurist should be able to determine their presence, and should possess adequate apparatus to make a scientific diagnosis. The influence of diseased teeth on the antrum of Highmore is a matter which the aurist and rhinologist should not overlook. A molar tooth may ulcerate into the antrum, and fill this cavity with pus. An apical abscess on a molar or a bicuspid tooth may be separated from the antral cavity by the normal layer of bone between the two and yet produce an active hyperemia of the mucous membrane of the antrum, which in turn, extends more or less to the entire lining of the nasal chambers. From this relatively obscure source arise many cases of so-called vasomotor rhinitis. For the diagnosis of diseases of the sinus and of diseases about the roots of the teeth, *x*-ray plates must of necessity play an important rôle.

The faucial tonsils, when diseased, exert a powerful influence on the middle ear. In every case wherein aural disease is present, the tonsils must be given careful consideration. No definite information regarding the condition of the tonsils can be obtained by inspection alone. The tonsils are so covered by the pillars of the palate and the plica triangularis that little can be seen of them in many instances. To properly examine these important organs, it is usually necessary to push the anterior pillar backwards with a suitable instrument. Another method to bring the tonsil into view is to insert a hook of some kind into a tonsillar crypt and draw the tonsil out into the fauces. Firm pressure exerted upon the anterior pillar will often cause cheesy débris to ooze from the crypts of the suspected tonsils. One, or all three of these methods should be used in the tonsillar examination in every case wherein middle ear disease is present.

Apparent size of the tonsil is very misleading. Tonsils that protrude into the throat are not necessarily any larger than those whose inner edges are flush with the palatal arches. This point is not generally understood by the medical profession in general and mistakes in diagnosis regarding tonsillar disease are not uncommon. Because the tonsils do not protrude into the throat and present an angry, reddened appearance, many physicians assume that they are normal. As a matter of fact, chronically diseased tonsils are often completely hidden from view unless the pillars are retracted by mechanical manipulation.

The age of the patient is not a factor in tonsillar disease; it occurs during all periods of life.

The so-called submerged or "buried tonsil" is not well understood by some physicians who regard it as a sort of "lost organ." This variety of tonsil differs from the usual type only in the sense that the plica triangularis is thicker and more nearly covers the free surface of the organ. Such a tonsil is also more firmly attached to the surrounding structures and lacks the mobility present in the more common type. The diagnosis of disease of a "buried tonsil" is much more difficult, as the plica and anterior pillar are frequently so adherent to the body of the tonsil that they cannot be mechanically retracted. It is sometimes necessary to incise the plica triangularis in such a case before the condition of the tonsillar crypts can be determined. In operating upon buried tonsils, the first procedure is to make a ring-shaped incision through the plica, care being exercised not to cut through the thick tonsillar capsule. The incision should be made with a fine pointed, sharp knife. The tonsil can usually be retracted into the fauces when the incision is complete. The operation then proceeds in the usual manner. Occasionally, but not often, some difficulty will arise in freeing the pillars from the tonsil; in which case care must be taken lest the delicate pillars be torn.

Having thus far considered only the relationship between chronically discharging otitides and the factors responsible for their existence, we may now consider briefly the necessary surgical treatment. The operation for the removal of adenoids is usually considered to be a simple performance, which almost any physician can do. This is far from true. If thoroughly performed, the operation requires a considerable amount of experience. No instrument yet constructed is alone sufficient. The soft growth in the fossa of Rosenmüller must be gently but thoroughly removed if relief from aural symptoms is to be obtained. To attempt curetting of this space with an instrument would be a hazardous performance; for the tube might easily be injured. This part of the operation must be accomplished with the tip of the finger, wrapped in gauze, or the finger nail. The sense of touch is necessary, first, to detect the extent of the growth to be removed, and, second, to recognize the tube and not injure it. Another important reason why the finger should be used to complete the operation, is that hypertrophied lymphoid tissue often extends over the entire length of the posterior pillar of the palate and of the lateral wall of the pharynx almost to the level of the tongue. No instrument will detect this swollen, easily bleeding mass; without the use of the finger, the growth will be left behind.

Tonsillectomy has become a highly developed operation, and is a distinctively successful one. Any instrument which will cleanly, and without undue force, remove the entire tonsil from its attachments is all that is required. The secret of a successful and easy removal of the tonsils is to find the natural line of cleavage and keep within its confines. The operator who learns this procedure finds the operation to be simple and almost bloodless if he keeps his instruments between the plica triangularis and the capsule of the tonsil. If he penetrates the capsule and enters the soft tonsillar tissue, he finds the operation tedious and difficult, often complicated by troublesome hemorrhage. Contrary to what was formerly believed, dissection by blunt instruments does not give immunity from post-operative hemorrhage. Such hemorrhage comes from the large arteries. These arteries are severed by the snare wire and not by the preliminary dissection. On the other hand, much of the post-operative soreness which most distresses the patient comes from the wounded palatal surfaces rather than from the separation of the body of the tonsil from the superior constrictor muscle. For this reason, sharp dissection of the pillars from the edges of the tonsil has much to do with the patient's after-comfort.

Marked deflections of the septum are easily recognized. The form assumed by the deflection varies considerably. There is the simple bending or bow-shaped deflection, the compound bend, and the angular bend. All produce deformity, with consequent alteration of the nasal chambers. There is another type of deflected septum, the altered form of which is so slight as to be often overlooked. This is the bending of that part of the septum which is immediately opposite the second turbinate, extending very little, if at all, below the level of this structure. Such a slight deformity is not recognized upon casual inspection. It is only by a careful study of each side of the nose and by a comparison of the one with the other that its existence is determined, Personally, I measure carefully with my eye the inner or septal edge of the middle turbinate. If the head is rigidly fixed in the middle line, the edge of the turbinate may be seen on one side, while on the opposite side only a portion of the second turbinate is visible if the septum is deflected. In certain cases, upon inspection, both sides of the septum opposite the middle turbinate will be seen to be bending outward. In such cases the application of epinephrin for a few moments will usually cause the swelling on both sides to disappear. This means that the mucous membrane is swollen, due to causes elsewhere in the nose or throat. If this swelling is marked and persistent, it is necessary to determine the cause of the swelling, which decreases the air currents through the middle meatus as effectually as does a bony deflection. The air passage through the middle meatus has great influence on the proper action of the eustachian tube; hence it is very important that it be open and free. One great reason why septum operations are not more successful is that the dissection is not carried high enough to open this important space. Every operation on the septum should bring both middle turbinates plainly and equally into view.

The local treatment of intermittent chronic purulent otitis media consists first of all in keeping the canal as dry as possible. All granulation tissue should be removed, if possible. Aural polypi must also be removed, of course. Syringing with watery solutions over long periods of time does more harm than good as it has a tendency to promote the growth of granulations. The use of powders must not be recommended to patients for home use. Peroxide of hydrogen as an antiseptic or deodorizer is advocated by some aurists and condemned by others. Nitrate of silver solutions in various strengths are widely used and doubtless are of value in certain cases. Trichloracetic acid, chromic acid, and other caustics have been advised in selected cases where granulation tissue is abundant, but they must be used with great caution. Alcohol, with or without the addition of boracic acid is the favorite treatment with most aurists. Many cases of chronic otitis media, yield like magic to alcohol instilled into the ear once or twice daily, while other cases are made distinctly worse by this remedy. Occasionally, diluted alcohol produces better results than the full strength. Patients subject to chronic middle ear disease should not be allowed the pleasure of salt water bathing, even with rubber or cotton plugs in the diseased ear.

Operations designed to occlude the eustachian tube in its bony portion are recommended by certain well known aurists. In selected cases such operations have doubtless been successful.

Faithful, regular treatment of the middle ear by the aurist, assisted by honest, untiring effort to comply with the aurist's instructions on the part of the patient, often bring about the desired result. If success is not obtained within a reasonable length of time after all local measures have been exhausted and after all pathological conditions in the nose or the throat have been removed, we may consider that the chronic purulent otitis media in question belongs to the class 1 division, which requires radical surgical intervention for a permanent cure.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

NEW YORK, MAY, 1920.

DEATHS AND POISONING FROM LOCAL ANESTHETICS IN THROAT SURGERY.

Of very great interest, it seems to us, is the report at the meeting last month of the American Medical Association in New Orleans, before the Section on Laryngology, of the special committee on the Advantages and Disadvantages of the Various Local Anesthetics in Nose and Throat Work.

Appointed at the preceding annual meeting, this committee (Emil Mayer, New York, chairman; Ross H. Skillern, Philadelphia; Robert Sonnenschein, Chicago) planned: to compare local anesthesia and its effects with general narcosis; to check laboratory against clinical data; to ascertain what clinical literature offers in support of the use of the several local anesthetics in different conditions and of concentrated rather than dilute solutions; to determine what cases show idiosyncrasy; to ascertain the relative merits of cocain and the synthetic products; to determine whether hemorrhage during or after operation is greater with local than with general anesthesia; to study the toxicity of local anesthetics; to note the effects of the previous administration of morphia; and to make recommendations.

The Council on Pharmacy had previously made requests through many journals for reports on fatalities from local anesthetics, and had received only two replies. The Committee had a similar experience. When, however, a questionnaire was sent to 150 members of the Section, many toxic effects were reported and *twenty deaths,* most of them not previously recorded. Two of these were in nose operations. In one of them death followed immediately the injection of a weak solution of procain and adrenalin (epinephrin) into the septum; in the other a 10% solution of cocain was injected into the nose by mistake for a 1% solution. Of the fatalities in throat cases, 12 occurred following the use of cocain, 5 from "novocain," 1 from "procain." Of the cocain deaths, 5 were due to avoidable mistakes (by the druggist, attendant, etc.) Careful investigation failed to show that adrenalin was a causal factor.

It will thus be noted that the number of cocain deaths was about double that of the number of deaths following the use of novocain (the foreign preparation) or procain (the same drug manufactured in America); which, however, is less striking when one reflects that cocain is used much more commonly by throat surgeons, than any of the synthetic anesthetics. Moreover, no satisfactory substitute for cocain as a topical application has yet been established.

Among the newer drugs that have been highly commended are benzyl alcohol and allocain; but the Committee found not sufficient evidence to warrant any report on these.

Toxic effects, short of fatality, were noted from cocain, novocain, apothesin, beta eucain and stovain. In one case in the literature idiosyncrasy was reported. In any case in which such an idiosyncrasy is suspected it would seem wise, as the committee recommended, to make preliminary trials of the drug in small doses.

Edema and sloughing followed the use of quinine urea. One writer who recorded 390 tonsillectomies with this anesthetic, now states that he has not used it in two years, although no publication had been made retracting his former views! Another writer who had once stated that quinine urea came nearest to the ideal local anesthetic, now admits that he has ceased using it. The Committee reported that this drug is no longer employed in nose and throat surgery.

Animal experimentation was undertaken for this investigation, as to the effect of morphine and the local anesthetics combined. The results were rather negative and the Committee expressed the belief that the employment of morphine is not contraindicated.

Among the disadvantages ascribed by some to local anesthetics are difficulty of control of bleeding at or after operation, and difficulty of sterilization of the drug. The Committee found that the vast majority of operators found no great trouble from hemorrhage either during or after operation. The difficulties of sterilization can be overcome by preparation of concentrated solutions, kept in sterile vials and diluted when required.

In America, at least, local anesthesia is the method of choice in intranasal operations. In throat operations also it is preferred by the majority of American laryngologists. The Committee found that experience in the war had much to do with the conversion of those opposed to local anesthesia. Neither the toxic effects nor the occasional fatalities from its use are more dangerous, or more numerous, than the corresponding hazards of general narcosis. Even the nitrous oxide combination looked upon by many as absolutely safe, has its toll of mortality. One observer reported 37 deaths from this "safest" anesthetic.

Concerning the employment of the synthetically prepared local anesthetics the Committee stated that they may be freely injected if this is done slowly and in proper doses; that the greatest danger lies in too rapid injection or entering a vein; that fatalities occur immediately or not at all; that the drug is eliminated in the liver; that a peculiar susceptibility does exist in some individuals; and the Committee suggests that all operations be performed with the patient recumbent from the first application of the local anesthetic, each operation to be preceded by a hypodermatic injection of morphia and atropin, and the patient not allowed to leave the hospital immediately after.

A NECESSARY ADJUNCT TO GENERAL ANESTHESIA IN THROAT OPERATIONS.

In spite of the development of nice technics of local anesthesia for tonsillectomy and the increasing popularity of this method for the operation in adults, it is to be noted in the literature from time to time that not a few specialists continue to prefer general narcosis. They point out, in making comparisons, that the local method is also not free from danger, and in this they are supported by the report of the special committee of the Section on Laryngology of the American Medical Association not yet published in full but outlined above in its essentials.

In the Journal, March, 1916, we called attention to the danger, under general anesthesia, of the formation of lung abscesses after tonsillectomities, in connection with the report in that issue, of nine such cases studied clinically by Manges. Lung infections after throat operations were not then altogether unrecorded, but the danger was not widely recognized. Today it is better understood and, we hope, generally guarded against by the dependent position or by the employment of some suction device to keep the fauces clear of blood or pus, or by both. The inspiration of these fluids is a hazard inherent in operations within the mouth and throat during narcosis and one who performs a bloody operation in either of these cavities without *adequate* means of obviating this danger wilfully or ignorantly places his patient in jeopardy.

THE NESTOR OF LARYNGOLOGY.

Whatever profession or trade one pursues he should take interest in its history and pride in the accomplishments of those who developed it. Throat specialists of this country have especial reason to be proud of the history behind them for, except the epoch-making introduction of laryngoscopy, the most important early contributions to the science were American. . . . "This specialty as a distinct part of regular medical practice seems to have originated in America, Horace Green being the first, at all events in recent times, who devoted himself to throat and respiratory diseases. . . . To enumerate all the contributions to the science of laryngology from this country would be impossible. Even today the work of Horace Green has never been surpassed."* The tonsillotome is American (Physick, 1827, Fahnestock, 1832). Rhinology, too, had its foundation in America. The earliest laryngological societies were American and so, too, probably, was the first throat clinic.

In reflecting upon the accomplishments of those Americans who laid the foundations in laryngology and rhinology—Bosworth, Ingals, Sajous, Louis Elsberg, Allen, Knight, O'Dwyer, John Mackenzie, Jarvis, Shurley, Roe and others—it seems appropriate in this special issue of the Journal to say a word concerning the survivor among the brilliant pioneers, J. Solis-Cohen of Philadelphia.

Returning from service as a naval surgeon in the Civil War he devoted himself to a field which, in spite of the introduction of the laryngeal mirror several years before, had not been closely studied. At a time when diseases of the pharynx and larynx were treated chiefly by internal medication and, more or less, by topical applications, he made visual observations of the pathogenesis of the diseases of these structures and essayed their more exact diagnosis and their specific local treatment, surgically and otherwise. As early as 1866 he gave private lectures on laryngology. He was among the first to perform laryngectomy for carcinoma and made important observations on the post-operative and later management of these cases. His investigations into medication of the air passages by sprays and vapors, published in a monograph, established these procedures upon a rational basis. In 1872 appeared the first edition of his treatise on diseases of the throat, the most comprehensive work on the subject that had ever been published. Today, after a half century, it is still often quoted and it will remain, like the treatises of Astley Cooper or Samuel D. Gross, among the classics of medical literature. In 1880 he founded, with Louis Elsberg, Knight and Lefferts, the *Archives of Laryngology.*

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*Howard Kelly's "Cyclopedia of American Medical Biography."

Several years ago, while still in the prime of his usefulness. Dr. Solis-Cohen voluntarily resigned his professorship at the Jefferson Medical College and his active hospital work "to give younger men a chance"; but he has continued in the practice of his loved work and is often consulted as the arbiter in obscure cases. Of scholarly intellect and broad culture, he is charming as a speaker, delightful in his reminiscences of earlier days, still wide in his visions of the future. Long may he continue among us, an ornament to the profession he has honored, Nestor of American laryngologists!

UNTRAINED "THROAT SPECIALISTS."

Discussing "Adequate Preparation for the Practice of Otolaryngology" (*Journal of the American Medical Association,* April 10, 1920) Dr. George Shambaugh of Chicago said:

> ". . . . The country is literally flooded with general practitioners who have found a lucrative field of work in doing operations on the nose and throat, but who have had no fundamental training in otolaryngology which has prepared them to make the proper examination or to diagnose the conditions requiring these operations. For years general practitioners have been coming to our city clinics, especially to the so-called post-graduate schools, with the sole object of learning the technic of a few operations on the nose and throat. It has been proverbial that these men have not been interested in learning the principles of otolaryngology. Diagnosis has not especially interested them."

The deplorable fact cannot be gainsaid that many men, wearying of the grind of "general practice" have sought to secure more lucrative returns with less effort and easier hours, through a specialty that, as they view it, can be quickly learned and comfortably practiced. Otolaryngology, as they conceive it, is such a specialty; and so, after a brief course in a post-graduate school or a few weeks or months in an out-patient clinic they blossom forth to wreak their will on youthful or adult adenoids and tonsils, on nasal septa that deviate from the straight and narrow path. To them operations on these structures, though not perhaps the beginning and the end of the throat specialty, are at least its chief purpose and accomplishment. Some of them, to be sure, become dexterous and perform these operations creditably, many perform them very badly, and most who acquire no better training or broader experience are quite unable to determine the proper indications for treatment and woefully lack acquaintance with the pathology of the diseases they essay to treat.

Such a state of affairs is far from creditable. It is up to the leaders in otolaryngology in America to bend their efforts to correct it. Help, direction, opportunity will accomplish it, not mere condemnation or derision. The American College of Surgeons has made a start by establishing a standard, but the means should be provided for attaining that standard. For this purpose Shambaugh wisely suggests that post-graduate training in the specialties should be the work of our universities:

> ". . . Courses of instruction aiming to drill the student in the established facts in medicine are always superficial. It is not so much the number of facts that the physician is able to acquire in his preparation as a specialist that matters. It is rather the training to investigate these facts that is of greatest value. It is right here that post-graduate instruction in this country and abroad has failed signally in the preparation for special practice. Physicians who have relied on the taking of such courses for their preparation have too often completed this instruction with the belief that they have acquired a knowledge of the important things in otolaryngology, whereas they have missed entirely the most important element in the proper training of the specialist, namely, the training, and the desire inspired by the training, for investigating these facts."

GLOSSECTOMY AND LARYNGECTOMY.

Glossectomy and laryngectomy for carcinoma of the tongue and of the larynx are undertaken not merely to relieve suffering but also in the hope of effecting a cure. They are formidable operations, and in a large percentage of cases they do not lengthen life but promptly terminate it. For this reason and, still more, because it involves the loss of articulate speech, one should not be disposed to argue with any patient, young or old, who objects to the sacrifice of his tongue or his larynx.

A UNIQUE MEDICAL CONTRIBUTION.

We would call our readers' attention to the very interesting article, in this issue of the Journal, on the cosmetic surgery of the nose, written by Dr. Gustav Tieck, not merely because of the excellent results he appears to be able to accomplish, but, especially, because he labored for twelve years, developing his methods through an experience in over one thousand cases, before he essayed to publish his work. Surely a shining example!

Surgical Suggestions

Injecting colored paraffin into a thyro-glossal sinus facilitates its excision.

Relaxed ear drum is one of the causes of partial deafness. Politzerization makes it worse, not better.

A persistent cough, especially in a child, may be due to a foreign body or impacted cerumen in the auditory canal.

Large hard lymph nodes in each sterno-mastoid region may arise from a neoplasm in the nasopharynx.

Submaxillary lymph gland enlargements, especially in children, often have their origin in infections of the nose—sometimes by a foreign body.

Thrombosis of the jugular vein is most often caused by mastoiditis, but phlebitis or thrombosis of this vein is occasionally produced by suppurative processes in the neck.

In aged individuals who apparently have never had evidences of syphilis one is most apt to be led astray by some late manifestation of the disease.

In determining whether an ulcer of the tongue is syphilitic or malignant a positive Wassermann reaction is not sufficient without also removing a section for microscopic examination. The lesion may be an epithelioma in a syphilitic!

The line of incision into a peritonsillar abscess may be anesthetized by swabbing it with a five per cent. solution of cocain and then infiltrating it, by means of a hypodermatic or other syringe, with one-half per cent. solution of procain.

In diabetes ether, chloroform and nitrous oxide narcoses are all very risky. Local anesthesia is safest whenever it can be used.

In diabetes examination of the blood itself (hyperglycemia, acidosis index), and not merely of the urine, furnishes the proper guide in treatment and, especially, in determining for or against operation.

Progress in Surgery

Selections from Recent Otolaryngologic Literature.

Edward Bleier, M.D., Abstract Editor.

Displacement of the Eye in Association with Chronic Frontal Sinusitis, with History of Five Cases. R. C. Lynch, New Orleans. *Southern Medical Journal.* March, 1920.

If the straight edge is applied in a vertical direction to the upper and lower margins of the orbit and pressed against them, its surface will just come in contact with the cornea through the closed lid without making any appreciable pressure upon the globe. While a certain latitude is granted for obesity or emaciation and for natural deviations in bony development, this is said to be the normal position of the globe in its cavity (Fuchs). Any undue outward protrusion with or without lateral deviation, is termed exophthalmos, and can be said to be due either to an increase in the volume of orbital tissue or to a decrease in the capacity of the orbit cavity.

The author presents detailed reports of five cases of exophthalmos. The etiology in the different cases was an acute infection of a chronic mucocele of the frontal sinus, a traumatic non-infected mucocele of the frontal sinus, a gumma of the orbit, a metastatic carcinoma of the orbit, and a chronic frontal sinusitis with rupture into extra-dural space, producing an extra-dural abscess and its rupture into the orbit.

Killian Operation on Frontal Sinus and Ethmoids. Lewis A. Coffin, New York. *New York Medical Journal,* March 13, 1920.

Coffin reports the operation in a case of recurring acute sinusitis. An incision was made along the upper edge of the eyebrow curving around its nasal end onto the side of the nose and carried along the side of the nose to just below the lower border of the frontal process of the superior maxillary bone. The incision was carried to the bone except over the supraorbital ridge which was left as the Killian bridge. The soft parts at this point extending down to the periosteum were dissected back to a point under the supraorbital notch. The incision through the periosteum was now made under the orbital ridge and parallel with that ridge beginning at a point below the supraorbital notch and connecting with the incision along the side of the nose. The soft tissue, including the periosteum, were raised over the entire area of the frontal sinus, the side of the nose, and the orbital side of the orbital plate of the frontal bone. The entire anterior wall of the frontal sinus was removed and edges bevelled to the posterior wall.

The ethmoids were exposed by the removal of a rectangular piece of bone at the expense of the nasal bone, the frontal process of the superior maxillary bone and the lacrimal bone, and this opening was enlarged by the removal of the orbital plate of the frontal bone.

The frontal sinus was filled with polypoid tissue and polyps. Through the opening in the side of the nose the ethmoidal tract was cleaned up better than could have been done intranasally and the sphenoidal sinus was curetted out. The incision was closed with horse hair sutures —no packing having been placed in the field of operation. The patient is cured.

Headaches from Nasal Origin. John J. Shea, Memphis. *The Journal of the Tennessee State Medical Association.* March, 1920.

Headaches may be caused by nasal involvement either as a symptom of general, focal or local infection.

General.—Headache is one of the initial symptoms of all acute infections of the nose and throat, and is characterized by its generality rather than its severity.

Focal.—A general headache may be a manifestation of a focal infection of either the teeth or the tonsils, and as such will not be limited to one part of the head and obeys no rule as to its radiation. Neither does it come and go with any regularity. The vagueness of its character and the history of intercurrent tonsillitis or toothache will guide one in detecting the cause. An agreeable surprise is often in store for the operator in these cases, as the tonsil may be removed for a different focal symptom and the headache, which has not been associated with the tonsilar infection, clear up.

Local.—The largest number of headaches come from sinus diseases, either acute or chronic. There are two functions which a sinus must be able to carry out at all times, or else headache will be produced, i. e., ventilation and drainage. If either of these two functions is interfered with, the symptoms will arise and its severity is dependent upon the degree of disturbance. Taking the simplest thing possible, a blocking of the sinus opening, the blood will take up the oxygen and reduce the atmospheric pressure within the cavity. This leads to the production of a partial vacuum, which will give rise to a drawing pain over the sinus. The duration of the pain is limited to the time the sinus is blocked. If the sinus becomes blocked and drainage is partially or completely interfered with, headache will arise and will vary from a full feeling in the sinus to unbearable pain. The onset of the pain in the partial blocking begins after the patient has been up sufficiently long that some of the discharge has dripped out, leaving a partial vacuum behind. This condition of affairs will keep up the symptoms until sufficient discharge has escaped to allow ventilation to occur. Even though the sinus is discharging freely, if ventilation keeps up, the patient will be comfortable until he retires and the sinus refills, for the same cycle to reoccur the next day.

The maxillary sinus suffers the most from the troubles of its neighbors. Abscesses at roots of the upper bicuspids and first molars will rupture into it and set up an infection. Or it may become a reservoir for the discharge from infected ethmoids or frontal sinuses. In a large percentage of skulls there may be found a normal opening from the ethmoid into the maxillary antrum and when these become infected the pus will drop down into the sinus. The anterior ethmoids and frontal go hand in hand; for the infundibulum, which is the drainage canal for the frontals, makes its course down through the ethmoids and shares with them their infection and trouble. The hiatus semilunaris contains the openings for these two group of sinuses, and is protected by the anterior third of the middle turbinates. Hence, any pressure exerted upon the turbinate or any increase in its size from whatsoever cause will block the hiatus and dam back the secretions into these sinuses.

The posterio ethmoid cells and the sphenoid are separated by a thin partition which is easily broken through, and each drains by its own opening, the latter into the naso-pharynx and the former into the post-nasal cavity under the middle turbinate.

Conservative Tonsil Surgery. William L. Hellegas, Philadelphia. *The Hahnemannian Monthly.* April, 1920.

Hellegas reviewed the answers given at the Pennsylvania State Medical Examinations, to the question "On what general symptoms and on what condition in the tonsils would you advise enucleation of the tonsils?" On reading the answers to this question, he was convinced that a tonsil would not have been safe under any conditions with that particular crowd of young doctors.

Two main offending factors in the indiscriminate removal of tonsils may be considered—the clinics and the visiting school doctors. The school doctors do not have an opportunity for extensive examinations, and they send many children home with the suggestion that their tonsils be removed, instead of advice to have their tonsils examined. So the clinics get many of these children as well as others, many of them coming to the operating table without the surgeon ever having made a previous examination, local or otherwise. The rhinologist in his private practice uses more discrimination.

Hellegas does not underrate the importance of focal infection as an etiological factor in many conditions, nor minimize the absolute necessity for the enucleation of the tonsils in many such cases; *but,* for the sake of suffering humanity, *trace* the focus to the *tonsil* before removing it.

A Note on the Later History of Four Cases of Total Laryngectomy. Sir Charters Symonds, London. *The Lancet.* March 20, 1920.

The author reports four cases in which the larynx had been removed for carcinoma, that have lived in comfort for 8, 12, 15 and 22 years, respectively. He describes his special speaking tube.

The tracheal tube is of large size, slightly conical, and fits the trachea closely; it has no inner tube. It is inserted as soon as the trachea is brought forward at the operation. Fitting into this is the special apparatus for speaking, which has a flap-valve admitting air on inspiration. This valve closes on expiration, the air passing through a tube attached to the upper surface and thence into a rubber tube, by which the stream of air is carried to the lips. A vulcanite piece fits into the distal end of the rubber tube, the end of which is flattened and the orifice narrowed so as to deliver a broad and forcible stream of air. The exit tube, to which the rubber is attached, should have as wide a diameter as possible, and should be a good inch from the shield so as to carry the rubber clear of the chin.

This is the simplest form of apparatus in use, and enables the patients to speak clearly under almost all conditions. Symond's efforts to introduce a sounding reed into the tube have not been successful. The rubber valve of a motor cycle horn answered for a short time. The lips, however, very soon became glued together from the moisture and ceased to act. Those who have not observed the effect produced when the lip movements are made in the air current can hardly appreciate the clearness and loudness of the resulting utterance.

Bronchoscopic Treatment of Bronchiectasis and Pulmonary Abscess. Henry Lowndes Lynah, New York. *Medical Record.* February 7, 1920.

By the use of the bronchoscope in the treatment of bronchiectasis and pulmonary abscess many patients suffering from these conditions may not only be relieved, but even cured by the establishing of proper drainage of the lung.

In bronchiectasis, especially in cases following diphtheritic involvement of the bronchi, there is a marked peribronchial infiltration and connective-tissue thickening of the bronchial wall which often produces stenosis by subsequent contraction. These bronchial stenoses not only follow diphtheritic tracheobronchitis, but may also follow the sojourn of foreign bodies for a long period, influenza, syphilis, and other conditions in the mediastinum causing pressure from without, as in peribronchial infiltrations and mediastinal glandular pressure. Pressure from without the bronchus is often productive of a chronic inflammatory thickening of the compressed bronchial wall, which may cause stenosis later.

In intubated cases suffering from laryngeal diphtheria with obstruction of the lumen of the intubation tube, secretions may be retained in the lungs, and produce a "sponge soaking" of the lung structure, and the patient, being unable to expel this secretion from the lung, frequently succumbs. Such cases are frequently diagnosed bronchopneumonia, but the so-called bronchopneumonia is rapidly relieved by bronchoscopic evacuation of the secretion. As soon as proper pulmonary drainage is established, the condition of the patient improves.

In peanut bronchitis following the inhalation of a peanut kernel or particles of masticated peanut, a very severe reaction follows, and an enormous amount of secretion is produced by the irritant action of the peanut. If the peanut kernel or particles are not removed there is such retention and "sponge soaking" of the lung, with foul secretion, that the child succumbs later to pulmonary abscess and septicemia.

Lung abscesses may be either diffuse or circumscribed. In the diffuse variety the lung is usually "sponge soaked" with pus, the removal of which bronchoscopically will greatly improve the patient. On the other hand, a circumscribed abscess may be extremely difficult to cure, especially when the abscess attached by its stalk is at a right angle to the bronchus into which it pours its contents. If the stalk of the abscess connects in a line with the bronchus into which it empties, then it is not a difficult procedure to enter the abscess cavity and drain it properly, but a true circumscribed lung abscess is at times exceedingly difficult to cure.

Nerve Deafness Due to Congenital Syphilis in Three Children. M. B. Kay, Pittsburgh. *Journal of the American Medical Association.* April 24, 1920.

The cases reported are remarkable not because syphilis produced deafness, but because it attacked all three children of one family in the same manner, every other part of the body escaping but the eighth nerve. Owing to the fact that at least a year had elapsed before signs of deafness developed, Kay believes that these are undoubtedly cases of "late hereditary syphillis." Each of these children was put on ascending doses of potassium iodid, reaching 35 grains, three times a day. The general result has been good.

Incomplete Mastoid Operation As a Cause of Delayed Healing. Frederick Thayer Hill. Waterville, Maine. *The Laryngoscope.* March, 1920.

Hill presents the following conclusions:

1. The period of convalescence is mainly dependent upon the character of the operation. This is generally the cause for delayed or non-healing mastoids. Early healing and uneventful convalescence depends upon thorough exenteration.
2. Cases of delayed healing and requiring secondary operation are met more frequently in the diploetic and diplo-pneumatic types, where there is a persistence of the diploe or "dense mastoid mass."
3. The cause of this is neglect by the operator of certain areas, this oversight being less likely to occur in the cellular mastoid.
4. The "favorite points" overlooked are: the angle between the sinus and the floor of the middle fossa, the space between the sinus and the prominence of the digastric groove, and less frequently, the zygoma, posterior meatus wall and the tip.

Brain Abscess Complicating a Local Cranial Infection. William Sharpe, New York. *Surgery, Gynecology and Obstetrics.* March, 1920.

The mortality of patients having the condition of true brain abscess is high; without operation practically 100%, and with operation, 70% or even higher. Subdural and localized abscess are excluded. The diagnosis and accurate localization of the intra-cranial condition are most difficult and for these reasons the operation of drainage must always be considered as an exploratory procedure. The ideal operation is with the direct approach, through the infected mastoid area, dura, and into the adjacent abscess cavity, but only in the presence of a dura, adherent to the underlying cerebral cortex, thus walling off the infective process. In those other selected cases, in which the accurate localization of the abscess is impossible, and in the absence of dural adhesion to the cortex, an exploration of the hemisphere should be performed through the clean subtemporal area, and if the abscess is found, satisfactory drainage can be obtained. If the abscess is not found, then the risk of a resulting meningitis is practically nil, and it may be possible later to localize the abscess and to drain it. This operation, however, should be used only in selected patients and the operation of mastoidectomy with wide exposure of the dura, should always precede it, in order to remove the primary infective focus, and at the same time to ascertain the presence or not of an adjacent brain abscess. If the signs are not present, however, the dura of this infected area should not be punctured in the hope of locating the abscess, for the risk of a resulting meningitis is very high, whether the abscess is found or not.

Two Cases of Gradenigo's Syndrome. J. L. Maybaum, New York *The Laryngoscope,* March, 1920.

The syndrome described by Gradenigo in 1904, is characterized by an acute purulent otitis media, with or without mastoid involvement; intense pain in the temporal and parietal regions from involvement of the Gasserian ganglion, and paralysis or paresis of the abducens nerve of the same side as the aural lesion. Such a group of symptoms occurring during the course of a middle ear suppuration or of an acute mastoiditis, before or after operation, may occasion considerable apprehension of an intracranial complication. The cases reported by Maybaum had these symptoms in more or less characteristic manner. In one case, the complication occurred two weeks after a simple mastoid operation, while the patient was making a satisfactory convalescence. Complete recovery followed without any further surgical intervention. In the second case, there was a history of an acute middle ear suppuration which had completely resolved at the time Maybaum first saw the patient, and the syndrome had been present, with lessening severity, for a period of ten days; there was entire absence of signs or symptoms of mastoid involvement. A fulminant type of meningitis developed, from which the patient succumbed the following day.

Recoveries have been reported in many cases without mastoid operation and even without myrinotomy.

The explanation commonly given for the occurrence of this syndrome is that it is the result of a circumscribed serous meningitis from extension of the infection in the tympanum or mastoid to the tip of the petrous portion of the temporal; in other words, there is present an osteitis of the petrous portion. The abducens nerve is in contact with the periosteum at the apex of the petrous portion, at which point it enters the cavernous sinus, usually just external to the junction of the inferior petrosal and cavernous sinuses.

The Gasserian ganglion is in close proximity to the tip of the petrous bone, resting in a depression on the anterior-superior aspect, so that a process which would affect the abducens nerve at the tip would be likely also to include the Gasserian ganglion. In the mild types of otitis media it is entirely possible for the inflammatory process to extend to the apex of the petrous bone and to produce an edema or a local toxemia, which would readily interfere with the function of the abducens nerve and Gasserian ganglion. The petrous pyramid may be of a pneumatic character with large cells directly under the location of the abducens nerve as it enters the cavernous sinus, so that a purulent process would spread very readily to the apex.

Gradenigo classified these cases into three groups: (1) Those having typical syndrome. (2) Symptoms similar to the first group, but in addition accessory symptoms from a more extensive involvement (second, third and fourth nerve changes) or complicating lesions which may have no direct bearing upon the sixth nerve paralysis. (3) Fatal cases with diffuse meningitis.

A number of routes have been described by which the infection may reach the petrous portion from the tympanum. (a) Sublabyrinthine route: Extending from the tympanum below the labyrinth and internal auditory meatus to the petrous tip. (b) By way of the carotid canal, access to which is obtained by eroding the anterior tympanic wall or through the carotico-tympanic foramina, which give passage to the carotid branches of the tympanic plexus. (c) Infection through a layer of cells extending along the eustachian tube, thus passing from the tympanum to the petrous tip. (d) From the mastoid antrum the infection may extend through the subarcuate fossa or petromastoid canal, which passes inward beneath the superior semicircular canal, and reach a layer of cells lying above the internal auditory meatus and thus arrive at the petrous tip.

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CARCINOMA IN THE CERVICAL STUMP AFTER SUPRAVAGINAL HYSTERECTOMY; AND THE RADIUM TREATMENT OF CARCINOMA OF THE CERVIX.*

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While it is known that the corpus uteri may be the original site of carcinoma without appreciable involvement of the cervix, and *vice versa,* the occurrence is strangely at variance with modern pathologic precepts based upon anatomic and structural considerations. However, the coincidental development of corporeal and cervical carcinoma seems to be unusual so far as can be determined from operative and necropsy records. Obviously where operation or necropsy shows the corpus and cervix equally implicated in malignancy, certain determination of the situs of original development would be impossible.

The probable etiologic relationship between uterine fibromyomata and corporeal carcinoma has been carefully studied by some of the most prominent observers in the world; but, like the essential causative factor of malignant neoplasms developing in other situations, the problem remains unsolved.

It is interesting to note that the incidence of carcinoma uteri is nearly five times greater in women who have fibro-myomata than in those who do not. Noble states that the evidence is overwhelming that the presence of uterine fibromyoma leads to carcinoma; not that it becomes a carcinoma, but the presence of the tumor exerts an influence upon the nutrition of the uterus (or an influence upon nutrition which we do not understand) and as a matter of fact carcinoma develops—particularly carcinoma of the corpus. According to Winter, fibromyomata are a direct cause of carcinoma of the corpus uteri; and Piquand claims the evidence is convincing that fibro-myomata are a direct cause of carcinoma of the cervix.

The relative frequency of corporeal and cervical carcinoma has been variously estimated by different writers, and while there is no consensus of opinion, experience shows that the latter is more commonly observed in the proportion of about two to one. However, since uterine fibromyomata are now subjected to routine section and microscopic examination after removal, future statistics will probably show an increased percentage of corporeal involvement.

Of 3,786 patients with fibromyomata uteri mentioned by Noble and Cullen, 124 also had corporeal or cervical carcinoma, *i. e.,* slightly more than three per cent. Winter cites 1,270 cases of fibromyomata uteri with cervical carcinoma in 25, or about two per cent. Study of available statistics induces the conviction that approximately two and a half per cent. of cases of fibromyomata are sooner or later complicated by carcinoma of the uterine corpus or cervix. However, it seems quite improbable that uterine fibromyomata are a direct cause of cervical carcinoma as stated by Piquand.

The occasional development of carcinoma in the cervical stump, at various periods after supra-vaginal hysterectomy for uterine fibromyomata or inflammatory lesions, has been noted by many surgeons. And while careful search of the literature reveals only a limited number of such cases, it is believed not a few have occurred that have not been reported, and others have escaped recognition because of inefficient methods of investigation. In any event available records show that less than eighty cases have been thus far reported in the literature of the world.

Attention was first directed to this subject by Chrobak who reported three cases of malignancy in the cervical stump after supra-vaginal hysterectomy—two carcinoma and one sarcoma. The subject was later rather extensively reviewed by Botzong and his monograph, published in 1902, contained all the examples then recorded. Prior to 1913 the records of the gynecological clinic at Johns Hopkins Hospital showed only 2 cases. These were reported in detail by Leonard, who collected and tabulated 34 others from the literature, making a total of 36. In 1917 Vander Veer recorded 3 additional cases, two coming under his personal observation and one occurring in the practice of Bagot and Freeman of Denver, Colorado. He also cited 5 others without details, contained in a personal communication from Baldwin of Columbus, Ohio.

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*Brief extracts from this paper, including the personal case reports, were presented before the Jefferson County Medical Society, Louisville, Kentucky, November 17th, 1919, and will appear in the transactions of that organization.

Worrall in the same year reported 3 cases, which makes the total 47. To these I wish to add notes of 4 cases, three of which will be reported in detail, making the total number to date 51. In addition to these, according to Leonard, about twenty others have been mentioned casually, without details, in the literature at various times.*

The following statistical data embrace the records collected and tabulated by Leonard in 1913 plus those since appearing in the literature so far as it has been possible to obtain them. The cases mentioned by Baldwin and others without details are not included in the table which is compiled alphabetically according to authors without regard to chronological order.

Careful scrutiny of the foregoing statistics makes apparent the fact that in about 40% of the recorded cases cervical malignancy probably existed and was overlooked at the time the patient was subjected to operation for uterine fibromyomata or inflammatory pelvic disease. The observation is rather interesting that in this series of forty-three cases there were only four of sarcoma, which again emphasizes the fact that cervical sarcoma may be practically regarded as a pathological curiosity.

The table shows four cases in which there was an unknown or at least unstated interval between the original operation and the appearance of cervical stump malignancy (Chrobak and Richelot); among the remainder the longest interval was twenty years (Frank), the shortest one month (Jacobs). Three sarcomata and twelve carcinomata developed within one year after the original operation.

Author		*Supravaginal hysterectomy for:*	*Subsequent development*	*Type of growth in cervix stump*
Botzong		Myomata	4 years	Carcinoma
Chaput	(a)	Pelvic inflammation	1 year 3 mos.	Carcinoma
	(b)	Pelvic inflammation	1 year	Carcinoma
	(c)	Pelvic inflammation	6 years	Carcinoma
	(d)	Pelvic inflammation	2 years 6 mos.	Carcinoma
Chrobak	(a)	Myomata	(?)	Carcinoma
	(b)	Myomata	(?)	Carcinoma
	(c)	Myomata	(?)	Sarcoma
Currier		Myomata	4 years 8 mos.	Carcinoma
Fleischmann		Myomata	7 years	Carcinoma
Frank	(a)	(?)	1 year	Carcinoma
	(b)	Myomata	8 years	Carcinoma
	(c)	Myomata	20 years	Carcinoma
Freund		Menorrhagia	1 year 6 mos.	Carcinoma
Hargrave		Myomata	6 mos.	Carcinoma
Jacobs	(a)	Myomata	1 month	Carcinoma
	(b)	Myomata	1 month	Carcinoma
Kaufmann		Myomata	4 years	Carcinoma
Ladinski		Myomata	6 mos.	Carcinoma
Leonard	(a)	Pelvic inflammation	18 years	Carcinoma
	(b)	Bilat. ov. cyst and pel. inf.	3 years	Carcinoma
Lewis		Myomata	6 mos.	Carcinoma
Lumpe		Pelvic inflammation	1 year 8 mos.	Carcinoma
Manton		Myomata	3 mos.	Sarcoma
Menge		Myomata	9 mos.	Sarcoma
Newman		Myomata	7 years	Carcinoma
Noble		Myomata	8 mos.	Carcinoma
Norris		Myomata	2 years	Carcinoma
Olshausen	(a)	Myomata	7 years	Carcinoma
	(b)	(?)	7 years	Carcinoma
Price		Myomata	9 mos.	Carcinoma
Quenu		Myomata	5 years	Carcinoma
Richelot	(a)	Myomata	6 mos.	Carcinoma
	(b)	Myomata	(?)	Carcinoma
	(c)	Myomata	3 years	Carcinoma
Savor		Myomata	4 years	Carcinoma
Schenck		"Large ut. tumor"	5 mos.	Carcinoma
Turner		Myomata	8 mos.	Carcinoma
Vander Veer	(a)	Myomata	10 years	Carcinoma
	(b)	Myomata	2 years	Ch. inf. carc. (?)
	(c)	Myomata	5 years	Carcinoma
v. Ehrlach		Myomata	1 year	Carcinoma
Wehmer		Myomata	8 mos.	Sarcoma

In this connection it must not be forgotten that while fibremyoma and carcinoma uteri may coexist without immediate or subsequent cervical implication, yet proliferation of malignant cell elements may occasionally occur from the corporeal to the cervical endometrium. Where fibromyoma and carcinoma coexist in the uterine corpus, changes in the uterine mucosa resulting from the myoma may play a part in the production of malignancy; but it is positive that cervical stump carcinoma noted subsequent to supravaginal hysterectomy for fibromyoma uteri can not owe its origin to changes caused by the original neoplasm.

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*The following data are copied verbatim from Leonard's paper already mentioned: Richelot speaks of Hartman and Murtry each having seen one case, Le-Dentu two cases, and Pean "many more." Christopher Martin is reported to have seen seven instances of malignant disease in the cervical stump after supra-vaginal hysterectomy, developing from a few months to several years after operation. Ladinaki states he has seen three cases in addition to the one noted in the table. Savor speaks of a case seen by von Hacker, and Olshausen refers to one noted by Pawlik. Batigne, Condamin, Krusen, and Hammond, have also reported cases.

The remainder is also important that, based upon tactile sense and casual ocular inspection, the clinical diagnosis of early cervical malignancy may be a physical impossibility, no matter how experienced and learned the observer. Doubtless cervical carcinomata in many instances have been overlooked under such circumstances. Early diagnosis can be positively made only by careful pathologic and microscopic investigation. Not infrequently the presence of early cervical involvement has been detected by accident. Thus Kustner, according to Winter, discovered an early cervical carcinoma during autopsy upon the body of a woman who had died after supravaginal hysterectomy for fibromyoma uteri; and while performing abdominal myomectomy Landau detected a small carcinomatous plaque within the cervix. More recently an example of infinitely greater importance has been recorded by Cullen. Vaginal hysterectomy was performed for an interstitial uterine myoma. Routine laboratory examination of the specimen revealed the earliest squamous-cell cervical carcinoma he had ever seen. "Had an abdominal (supravaginal) hysterectomy been done instead of a total vaginal hysterectomy, we would ere long have had a well-marked carcinoma of the cervix and would have classed it as a carcinoma developing in the cervix after removal of the myomatous uterus, whereas the growth, though clearly present at the time of operation, would have been overlooked." (Cullen). Leonard properly suggests that in many cases no doubt cervical carcinoma, reported as having developed subsequently, was really present at the time of operation.

Case Exhibits.

(Frank.) October 12, 1918. Mrs. J., thirty-five, mother of one child (now fourteen years old), two abortions. Family history negative for malignancy. Nothing of interest in previous personal history, excepting supravaginal hysterectomy and bilateral öophorectomy one year prior to coming under observation. Patient did not know nature of condition for which operation was performed, nor were we able to ascertain. However, since then there had been almost continuous vaginal hemorrhage indicating probable existence of cervical disease at time of original operation though it had progressed only to slight degree. Patient had moderate leucorrhea with slight odor; said she had not lost weight nor strength; complained of constant pain in left adnexal region, but had not been confined to bed. Symptoms aggravated by unusual activity.

Physical examination negative throughout except for pain on palpation in left adnexal region and sanguineous vaginal discharge. Upon introducing speculum a small, ulcerated cervical nodule noted which bled readily upon manipulation. A probe passed two and a half inches into cervix toward left side. Clinical and microscopic diagnosis: adeno-carcinoma.

(Frank.) June 30, 1919. Mrs. H., fifty, mother of two children, two abortions. One daughter said to have had "fibroid tumor of the uterus." Patient subjected to supravaginal hysterectomy eight years previously for fibromyoma uteri. In May, 1919, slight bleeding from vagina, later several profuse hemorrhages. Ten days before coming under observation bleeding recurred and had continued. Some pollakiuria, no dysuria, no pulmonary symptoms. During last two months patient had complained of pain in back principally over third and fourth lumbar vertebræ. No pain in legs or thighs.

Physical examination disclosed indurated, cervical mass extending into left broad ligament. Cervix much thickened, indurated and fixed. Diagnosis, clinically and microscopically, carcinoma of the cervix uteri.

(Frank.) August 18, 1919. Mrs. W., fifty, no children, no abortions. Nothing of interest in family history. Patient operated upon for uterine fibromyoma twenty years ago; has had "rheumatism" ever since; attack of influenza in December, 1918. In February, 1919, had profuse vaginal hemorrhage lasting two days, which was finally controlled. At various times since has had continuous slight bleeding for several days and occasionally profuse hemorrhages. There was a watery vaginal discharge with foul odor. No pain in thighs, some pain in hips, but patient said "she had suffered with this for years." No vesical or other symptoms.

Physical examination revealed a mass or plug of tissue filling cervical lumen which bled readily when touched. There was apparently no extension into broad ligament. Diagnosis, clinically and microscopically, adeno-carcinoma.

(Price.) Mrs. D., forty-eight, Louisville Public Hospital—Service of Dr. L. Frank. Fibromyoma, supravaginal hysterectomy, February, 1919, by another surgeon. Nine months later post-operative ventral hernia repaired by Dr. Price. Examination then revealed neoplasm involving cervical stump. Pathological examination: carcinoma. "Extensive intra-abdominal adhesions together with a tumor which entirely filled the pelvic cavity."

(Noble). Patient, thirty-five, three children, one abortion. Chronic menorrhagia, numerous attacks pelvic peritonitis. Uterine fibromyoma cocoanut size, left ovarian cystoma, right hydrosalpinx; structures densely adherent in pelvis; tumors edematous and infiltrated with inflammatory products. Supravaginal hysterectomy, bilateral salpingo-öophorectomy. A typical condition of tumors attributed to repeated attacks peritonitis. Four months later irregular vaginal hemorrhages; eight months after operation examination disclosed extensive carcinoma involving pelvis, vagina and cervix. "As the specimens from this case were not examined, it is impossible to say definitely where was the primary site of the cancer; but, in view of the history both before and after operation, there is good reason to believe that a carcinoma of the body of the uterus existed as a complication of the fibroid tumor at the time of the operation, and that the disease had already involved the broad ligaments when the hysterectomy was performed."*

(Currier.) Patient, fifty-one. Fibromyoma uteri, supravaginal hysterectomy, bilateral salpingo-öophorectomy. Carcinoma left breast eighteen months later. Examination nearly five years after original operation revealed malignancy in cervical stump. Portio vaginalis large and movable, endometrium and tissues surrounding cervix sensitive to probe; cystic degeneration of os uteri; relaxation of vaginal walls. Cervix dissected from vagina found covered with thickened adherent peritoneum. No disease discoverable within pelvis. Mucosa of os uteri showed typical epithelioma; no proliferation into surrounding structures nor disintegration of tissue.

(Manton.) Patient, forty-five. Fibromyoma uteri, supravaginal hysterectomy, only small portion of cervix left. Three months later vaginal hemorrhage. Examination showed large cauliflower growth protruding from external os, friable, bleeding on slightest touch. Cervical remnant including neoplasm removed. Pathological examination original tumor then made which showed round-cell sarcoma. Cervical stump; spindle-cell sarcoma.

(Leonard.) Negress, forty-three. Pelvic inflammatory disease, omentum and sigmoid densely adherent in left-sided tubo-ovarian abscess. Supravaginal hysterectomy, bilateral salpingo-öophorectomy. Eighteen years later intermittent then continuous vaginal hemorrhage. Examination disclosed on posterior cervical lip roughened, friable neoplasm, bleeding on manipulation, apparently not extending beyond cervical stump. Cervix removed by Wertheim's method; dense adhesions about cervical stump, urocyst and ureters. Miscroscopic examination: squamous-cell carcinoma.

(Leonard.) Patient, thirty-eight. Bilateral ovarian cystoma, dense adhesions involving uterus, urocyst, omentum and intestines. Supravaginal hysterectomy, bilateral, salpingo-öophorectomy. Three years later foul vaginal discharge and hemorrhage. Examination revealed fungating, movable neoplasm involving cervix and vagina. Cervical stump, neoplasm and portion vesical wall excised. Microscopic examination: squamous-cell carcinoma.

(Vander Veer.) Widow, forty-eight, never pregnant. Fibromyoma uteri; supravaginal hysterectomy. Nearly ten years afterward vaginal discharge and hemorrhage. Later examination revealed cervical ulceration. Cervix removed through abdominal incision. Pathological report scrapings and section: carcinoma.

(Vander Veer.) Patient, forty-eight. Supravaginal hysterectomy for fibromyoma uteri. Two years afterward bloody, foul vaginal discharge. Cervical stump ulcerated, and granulating mass presented, removed through vagina. Pathological report: "chronic inflammatory condition, probably carcinomatous."

(Vander Veer.) Patient, thirty-eight. Fibromyoma uteri, chronic salpingitis. Supravaginal hysterectomy, bilateral salpingectomy. Cervical discharge continued, treated by family physician without benefit. Four years after operation profuse vaginal discharge, pain in abdomen, sacral region, and thighs. Examination disclosed advanced carcinoma cervical stump and left vaginal fornix extending into base left broad ligament.

The almost universal practice among surgeons heretofore has been to undertake radical operation for removal of the cervix so soon as evidence of malignancy appeared, provided the case was then considered operable and the physical status of the patient warranted operation. So far as I am aware there are no statistics to show the actual mortality in this class of cases; whether it is greater or less than that following primary operation for cervical carcinoma cannot be definitely determined; but the fact remains that in the majority of instances the cervical stump and other implicated tissues have been surgically extirpated according to one of the methods in vogue. For obvious reasons, such operations may be fraught with considerable difficulty and danger unless the surgeon is thoroughly familiar with the type of procedure required; particularly is this true where infection and glandular involvement have already supervened. Moreover, radical surgery has produced few permanent cures after adjacent pelvic viscera have become implicated in the carcinomatous process.

Attention is herein directed to the applicability of radium therapy versus surgery in the type of cases being considered. The following extracts from a recent paper by Janeway seem especially interesting and important in this connection:

> "When it is considered that at a conservative estimate eight thousand to nine thousand women die of uterine carcinoma every year in the United States, and that elaborate search shows only sixty-one women operated upon five years prior to 1916 who have been cured of cervical

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*In discussing Currier's paper (Amn. Gyn. Assn. 1906) Noble mentions a second case of carcinoma of the cervical stump. If he has made a detailed report of this second case I am unable to locate the reference.

carcinoma, can any consideration justify postponement of the general use of radium in the treatment of uterine carcinoma? While, of course, more than sixty-one women in this country up to five years ago have been cured of cervical carcinoma, by operation, yet this number indicates what a 'drop in the bucket' the operative treatment of cancer of the cervix uteri is toward meeting the real demands of this malady upon the medical profession; but granting that radical abdominal operation could cure one hundred per cent. of the operable patients of cervical carcinoma applying for treatment, there are not in the country a sufficient number of capable surgeons to perform the required work. Contrasting with these facts the record which radium has already made, however immature this record may be; the fact that it has produced cures of two to four years standing in cases too extensive for operation; the fact that it has produced cures of three years standing and over in a larger percentage of early cases than operation has produced—one author claiming for it in this stage one hundred per cent. of cures; the fact that treatment by it in no way interferes with the patient's routine life and subjects her to no risk; the fact that it is a remedy capable of being used by anyone possessing the simplest gynecological training, after receiving certain easily acquired technical instruction; contrasting these facts with the operative records, .. not the time ripe to urge each county medical society to make the effort to place a supply of radium in its district? Aside from the relief in advanced cases, can there be any doubt that, if such a plan be followed, more patients with uterine carcinoma would be cured than are now saved by operation, and a knowledge of this fact soon go further in inducing women to seek help in an early stage than are at present induced by the attractions of a radical abdominal operation?"

In the three personally observed cases mentioned herein radium therapy was employed. The first patient was given four treatments of 600 milligram hours each, viz., October 12, 1918, May 10th, June 27th, and July 26th, 1919. It was then noted that the cervix was completely movable, local healing had occurred, and no evidence of the pre-existing disease could be discovered. Examination October 19, 1919, disclosed no evidence of disease about the cervix and permanency of the cure seems reasonably assured.

The condition of the second patient was extremely serious when first observed. Hemorrhage had been profuse and dissolution seemed imminent. A 1200 milligram hour radium treatment was given June 20, 1919, and another August 12th. Examination then disclosed no induration on right side; on the left there was still some "thickening" which extended to pelvic wall; slight vaginal sloughing, otherwise vagina normal. The third treatment was given September 12th, 1919, at which time the patient was much improved, there being no evidence of the former disease excepting slight induration toward the left side.

The third patient was given a 1200 milligram-hour treatment, August 18, 1919. Examination October 2nd, showed perfect local healing, the cervix being movable and apparently normal. There was still slight evidence of "thickening" in right utero-sacral ligament.

It is believed that in cases 1 and 3 an absolute cure will be obtained; what the ultimate result will be in case 2 cannot be foretold. These patients are not completely dismissed, they are required to report at intervals for further observation just as are patients operated upon for carcinoma in other situations until they have passed the five-year limit.

During the thirty-two months between February 13, 1917, and October 13, 1919, exclusive of the three cases herein reported, radium has been used in the treatment of 38 patients with cervical carcinoma. Eight of the series would probably have been classified as operable; thirty were absolutely inoperable when first observed. Several of the latter group had been unsuccessfully treated by curettement and cauterization; all had been rejected for radical operation; many had been refused any operative procedure whatsoever.

Of the thirty-eight patients included in this series, eleven had died; four others are not well and may never be, though there is now no local evidence of disease, the cervix has completely healed, and no infiltration can be detected. Eighteen of the patients are absoluely well; some of these were treated two years ago; they are still under observation and will remain so for three years longer. For various reasons six of the patients could not be traced after treatment, therefore their present condition is unknown.

In the radium treatment we have as a rule given 1200 to 1500 milligram-hours as a dose. While we agree with those who state massive dosage for short periods is the better plan of procedure, yet by employing smaller dosage repeated or extended over longer periods identical results may be obtained. It will be noted that of the thirty-eight patients with cervical carcinoma, thirty of whom were classified as absolutely inoperable when first observed, permanent cure seeems assured in approximately fifty per cent.; and of the three cases reported in detail, where cervical carcinoma developed subsequent to supravaginal hysterectomy, permanency of the cure appears certain in two.

A statistical comparison of the ultimate outcome following radium therapy versus surgical removal of cervical carcinoma would seem of especial interest at this time. The following data are abstracted from the admirable article by Janeway which appeared only a few months ago, and to whom it is desired full credit be extended for the privilege exercised in excerpting and reproducing the material. Those who wish to pursue the study of this subject will find Janeway's contribution of absorbing interest. A complete bibliography to date of publication follows his article.

Summary of Janeway's tables shows the following figures; Carcinoma of cervix removed by radical abdominal operation: Of 5,027 cases, 1,720 or 34.21 per cent. were operable. Of 1,997 cases there was a mortality of 364, or 18.23 per cent. Of 1,090 cases there were 386 cures (with few exceptions five years standing), or 35.41 per cent. of traced cases, or 19.32 per cent. of cases operated on, or less than 11.72 per cent. of cases applying for treatment. Carcinoma of the cervix removed by vaginal method: Of 1,305 cases, 654 or 58.1 per cent. were operable (Schautá). Of 727 cases there was a mortality of 68, or 9.35 per cent. Of 647 cases there were 192 cures (five years standing), or 29.67 per cent. of traced cases, or 17.74 per cent. of cases operated on, or less than 11.72 per cent. of cases applying for treatment.

"While the immediate mortality in the most skillful hands is only ten per cent., it is still twenty per cent. in skilled hands, and in the hands of even Wertheim, during the period of development of his operation, in his first one hundred cases, it was thirty per cent. Such a high mortality restricts the usefulness of the operation to relatively few surgeons, entirely inadequate to meet the demands of the large number of patients having cervical cancer. Nor does this high mortality tell the whole story. It leaves out of consideration entirely, first, the necessity for restricting the operation to a small percentage of the most painful cases and second, the suffering entailed by the operation itself and its sequelæ. Such sequelæ followed von Rosthon's operations in no less than forty-two per cent., and included ureteral and vesical fistulae, secondary necrosis of the urinary bladder, injury to the rectum, fistulæ of the intestine, and in one case division of the obturator nerve with permanent paralysis of the leg. Weibel reports six per cent. of utero-vaginal fistulæ from the Wertheim clinic. Post-operative sequelæ, including suppuration of the abdominal incision, cystitis, peritonitis, ureteral fistulæ, vesical fistulæ, phlebitis, laceration of the rectum, pleurisy and recto-vaginal fistulæ occurred in twenty-two of Clark's thirty-six patients, or in seventy-three per cent." (Janeway.)

In expressing his dissatisfaction with the operative treatment of cervical carcinoma, Clark states: "If an operation or other therapeutic procedure is to have a permanent place in our armamentarium it must be sufficiently easy to make it available, not only for a few skilled specialists, but for the great body of surgeons working in every quarter of this and other countries. In these days of low mortality percentages, attending nearly all the major operations, no operation can possibly gain headway which combines with it a shockingly high mortality and a large number of distressing and disabling sequelæ." Similar views are expressed by Peterson.

According to Janeway, Wickham may be properly referred to as "the father of the radium treatment of cancer." His work dates from 1906, and his results of the treatment of one thousand cases were published in 1910 and 1913. The work of Dominici must also be mentioned. He was responsible for the development of numerous technical improvements, particularly the principles of filtration. Many later reports have appeared, especially by Caan (1909), Czerny and Caan (1912), Pinch (1912), Riehl, Ranzi, Schueller, Sparmann (1913); in this country, Abbe, and finally the book of Paul Lazarus (1913). Kroenig deserves credit for introducing radio-activity in gynecology; but the reports of Doederlin and Bumm (1913), and the papers by Cheron and Rubens-Duval, Schauta, Schindler, Scherer and Keley, and Latzko and Schueller (1913) furnished the great impetus to the treatment of uterine carcinoma by radium.*

Doederlein reported one cure of an operable case of cervical carcinoma, and excellent results in other cases, presenting microscopic sections showing the retrogression of carcinoma after use of radium. Bumm recorded nine instances of apparent clinical cure of patients with advanced cervical carcinoma by use of mesothorium and roentgen-rays. Cheron and Rubens-Duval mentioned one hundred and fifty-five results, conservatively classified as improvements, in one hundred and fifty-eight patients with advanced cervical carcinoma. Forty-six of these improvements were probable cures; in two of the cases, both inoperable, the cure was proved, in one by autopsy, the other by histological section.

Schauta cited eleven clinical cures in sixteen patients with cervical carcinoma treated by radium and mesothorium; he believed radium was the more effective of the two agents. Schindler described favorable results in cervical carcinoma treated by mesothorium and radium. Scherer and Keley concluded that the treatment of two hundred and eighteen cases of cervical carcinoma by roentgen-ray and radium gave 10.5 per cent. greater freedom from recurrence than operative measures alone. Latzko and Schueller cited five clinical cures in seven advanced cases of uterine carcinoma.

Later still more encouraging results appeared. Bumm mentioned one hundred and eight cases of cervical carcinoma treated by radium; of these only five were operable; among them were fifteen recurrences; clinical cure produced in ten inoperable cases. Doederlin and von Seuffert obtained disappearance of subjective and objective symptoms in thirty-one of one hundred and fifty-three cases of uterine carcinoma; twelve of the thirty-one were inoperable. Kroenig recorded two hundred and fifty-four cases of uterine carcinoma treated by roentgen-ray and mesothorium; sixty-four were treated prophylactically after operation and one hundred and fifty entirely without operation; nineteen remained free from cancer. He concluded that where carcinoma was still localized in its primary site (the type usually termed operable), complete disappearance of the carcinoma occurred so far as could be recognized histologically. His longest cure was two years. He had not been able to cure metastatic carcinoma, nor cases where the disease had invaded neighboring tissues, deep invasion for instance of the broad ligaments, though remarkable retrogressions and temporary cessations of growth had followed treatment of the latter.

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* It may be of historcial interest to observe that radium was not actually discovered by Madame Currie, it was merely isolated as an element by her. Radium was known as early as 1850 as a compound, and some of its characteristics were described by its discoverer.

Dobbert (1914) reported the results of treatment in forty-four cases of uterine carcinoma, thirty-one of which involved the cervix; eighteen were inoperable and six operable. He concluded that it was permissable to treat early operable cervical carcinoma by radium alone. In many deep invasions around the original situs elimination of the growth might be expected; and in more advanced cases temporary cure might be obtained; he discouraged treatment in far advanced cases. Weinbrenner described eight successful results in thirty-two cases of genital carcinoma by use of mesothorium. Allman recorded the results in eighty-five patients with uterine carcinoma treated by mesothorium; fifteen were free from symptoms, these either had recurrent growths or had refused operation; twenty other inoperable cases became operable. Favorable results in genital carcinoma are also reported by Legneu and Cheron, Morton, Dieffenbach, Foveau de Cournelles, Jacobs, Kroemer, Tate, Pozzi and Rouhier, Oertel, Seuffert and Klein.

Far more definite results were recorded in 1915 many of which gave evidence of permanency of cure by radium treatment. Thus Doederlein mentioned 12 patients with inoperable uterine carcinoma who had remained well more than a year after treatment by radium, and definitely advocated radiotherapy for operable carcinoma uteri. Since December. 1913 (one and a half years), Flatau had not operated upon a single patient for cervical carcinoma and had obtained a greater number of recoveries than following operation. Burrows reported that disappearance of early cervical carcinoma and marked improvement in more advanced lesions was fairly constant after radium treatment. Degrais cited "a number of patients" with cervical carcinoma treated by radium who were well four years afterward.

Kelly and Burnham (1915) reported the results of treatment in 213 patients, 14 of whom were operable. Of the operable cases four were treated with radium alone and were well, two of them two years and two one year after treatment. The remaining ten in the operable group were operated upon first and radium used afterward. All remained well six months to three years after treatment. These results are considered suggestive when it is considered that after operation alone there is recurrence in seventy-five per cent., and in sixty per cent. during the first year. One hundred and ninety-nine patients were inoperable at time of treatment; these included inoperable primary neoplasms and inoperable recurrent cases. Fifty-three of this group were clinically cured and one hundred and nine improved. Of thirty-five patients in this group, all primarily inoperable, three have remained well four years; two for three years; and seventeen over one year. Eighteen primarily inoperable recurrent neoplasms in this group remained clinically cured; one over six years; another over four years; eleven over two years; ten over one year. In other words, fifty-seven of the two hundred and thirteen patients with cervical carcinoma, four operable and fifty-three inoperable, were cured by radium; *i. e.,* all the operable cases and twenty-six per cent. considered inoperable at time of treatment. Baish, since February, 1914, treated all cases of uterine and vaginal carcinoma with radium; a total of one hundred cases were recorded, divided into three groups: Group one, forty-three patients, were all inoperable with definite parametrial infiltration; many of these were benefited but only one clinically cured. Group two, patients on the borderland of operability; of these ten, or 50 per cent., were clinically cured. Group three, included thirty-seven operable patients; of these twenty-eight, or 75 per cent., were clinically cured. Adler recorded clinical cure in nine inoperable cases of cervical carcinoma, two inoperable carcinomata of the uterine corpus, and one of the vagina. Excellent results in advanced genital carcinoma were reported also by St. Clair, Fabre, Sir Thomas Oliver, von Graff, Miller, Fueth and Ebeler, Bergonie and Speder, Abbe, Kolischer, Turner, Ranschoff and others.

Schmitz (1916) recorded his results in the treatment of eighty patients with pelvic carcinoma. Clinical cure was obtained in eleven of thirty-five cases of inoperable carcinoma of the uterus; in seven of twelve operable patients; and in four of fifteen recurrent cases; making twenty-two clinical cures (sixty-two patients) or 35.5 per cent. His report is significant when it is considered that fifty of his sixty-two patients, or 80 per cent., were inoperable.

During 1917 many important papers appeared confirming previously reported results. Maiolo treated fifty patients, all inoperable or recurrent after hysterectomy. Eight were recently treated; of the 42 remaining, 16 were anatomically and clinically cured after one to two years. Esquerido mentioned twelve patients with uterine carcinoma treated. Of these three were operable and all completely retrogressed; of the remaining seven inoperable patients, three were apparently cured. Of 120 patients with uterine carcinoma treated by radium, Bailey reported 16 apparently cured. Post-treatment period; two years in one case; one and a half to two years in four; six months to one year in eight; one to six months in three. Myers reported excellent results in three of five patients treated. Favorable results were also recorded by Labhardt, Klatz, and Heimann.

Recasens at first employed radium only in cases too far advanced for operation, or where operation was contraindicated; but his uniform success made him no longer hesitate to treat early cervical cancer with radium. He reasoned that if in inoperable carcinoma in which actual extension to the parametrium existed, so that the possibility of cure by operation could no longer be entertained, one could obtain a cure by radium in 60 per cent. of the cases, it was only logical to believe that in early circumscribed carcinoma of the cervix cure by radium was more certain. He contrasted the gravity of the Wertheim operation, with its primary mortality of 10 to 15 per cent. in hands of the best surgeons and its secondary mortality after three to five years of 40 to 50 per cent., with the comparatively safe and simple procedure of treatment by radium with its "100 per cent. of cures" in this stage. His belief that 100 per cent. of early cases were cured by radium was based on the fact that every one of sixteen cases treated had undergone complete retrogression, and a number of these had already completed three years since treatment. In addition to these operable cases he had treated 182 patients with inoperable cervical carcinoma. Forty-seven of these were treated in 1914; 29 had remained well. Seventy-nine patients were treated in 1915; 45 of these were well. In 16 cases of corporeal carcinoma, eight were clinically cured, six died and two were still under treatment. He concluded that 70 per cent. of his inoperable carcinoma cases, and 95 per cent. of those in which the growth was still limited to its original situs, had been cured by radium.

Clark recorded 100 patients with genital carcinoma treated by radium; 74 of these were carcinoma of the cervix and four of the fundus. Fifty-five of the patients were living and free from symptoms, two to thirty months after treatment; five of them twenty-two to thirty months afterward.

Janeway's personal statistics embrace the following: Seventeen patients with cervical carcinoma, twelve of whom were clinically cured six months to three and one-third years after treatment with radium. There were four cases of recurrent cervical carcinoma. Of these two were clinically cured, 16 months and 25 months after radium treatment, and one was improved. His series included four cases of fundal carcinoma. Two of these were clinically cured 14 and 21 months after treatment; the other two were improved for period of two years. Five cases of carcinoma of the external genitals are cited. Three of these were clinically cured 16 to 21 months after treatment instituted; one improved, and one unimproved.

Analysis shows that these cases, 30 in number, have a post-therapeutic period varying from three and one-third years to six months, and comprises seventeen carcinoma of the cervix, four recurrent carcinomata of the cervix, four carcinomata of the fundus, and five carcinomata of the vulva (labia minora and clitoris.) Of the 17 cervical carcinomata the post-therapeutic periods are: one three and one-third years; one three years; one nearly one year. Nine of the remaining cases treated within the last year have undergone continuous retrogression. Five of the seventeen patients with cervical carcinoma returned after the first treatment and are again under observation. In two of these a large portion of the vaginal wall was involved. Two others had extensive hemorrhage for many months before radium treatment was instituted. The remaining patient had an advanced lesion, has been recently treated, and is still under observation. In the four cases which developed recurrence there was primary retrogression complete for a short period in two, and became almost complete in the other two. In all four the recurrence or renewed growth developed within four months after the first treatment. The fifth patient is improving, but the disease was so extensive at the time of treatment that a cure is not expected. Of the four cases of recurrent cervical carcinoma, one patient first treated two years ago, and the second treated one year ago, remain free from evidence of disease. The third treated first two years ago recently required another treatment, and there are now symptoms of metastasis in the upper pelvic glands. The fourth patient was not improved. Of the four patients with fundal carcinoma, one (an old lady) died of intercurrent diseases two years after radium treatment; she had no return of her uterine symptoms. The second patient remained in perfect health for two years after the first treatment. The third patient, treated one and a half years ago, and the fourth patient, treated within the past year, have remained free from symptoms. The five cases of vulvar carcinoma have no especial bearing on this paper and are therefore not further reviewed.

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THE ASSOCIATION OF OBSCURE ABDOMINAL SYMPTOMS WITH NON-ROTATION OF THE COLON.

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The fact that even in comparatively rare instances the colon fails to rotate in fetal life is a matter of considerable importance. The resulting course and position of the intestinal tract cannot be made out with any certainty by ordinary methods of examination and during abdominal operation dangerous delay in finding the cecum and appendix may result unless the anomaly has been demonstrated by a previous roentgen examination. Owing, however, to the comparative rarity of the condition and the meager literature upon the subject the case here reported might well have been overlooked had the examination not been complete. Until the entire arrangement of the colon could be worked out many explanations of the abnormal course taken by the opaque meal presented themselves.

CASE REPORT.

Female, age 45, nullipara. Referred by Dr. George Gray Ward with the statement that the pelvic organs seemed normal. For twelve years she had complained of periods of lower abdominal pain and "gas distress," lasting a few days to a few months, accompanied by nausea, occasional vomiting and frequent epigastric pain immediately after eating. During these periods many different physicians had failed to find any tenderness in the right iliac fossa and only on one occasion had an appendix inflammation been suggested as a cause of the disability. The patient was of somewhat anteroptotic build, fairly well nourished but evidently reduced in weight. There was a localized area of tenderness midway between the umbilicus and the symphysis, somewhat to the left of the middle line. There was no tenderness in the right iliac fossa. The test meal and stool were normal.

Roentgen examination. Under the fluoroscopic screen and in roentgenograms the stomach and cap appeared perfectly normal. Fifteen minutes after the ingestion of the opaque meal the duodenum and jejunum were visualized as shown in Plate I. Evidently the course of the duodenum was abnormal and the small intestines occupied the right side of the abdomen. At the end of three hours there was a considerable residue in the stomach and the meal had passed into the large intestine. As shown on Plate 2, the terminal ileum enters the cecum on the right side. The shape of the cecum indicates that it is turned around from the normal so that the outer convex surface is towards the left side of the body. The end of the column is in what may be called the transverse colon. At the end of six hours the stomach was empty (Plate 3), the ileum contained only a very small amount of the meal and entire color was outlined. The course of the colon could be satisfactorily worked out only by palpation under the screen as it is bunched in a small area. The various parts were freely movable.

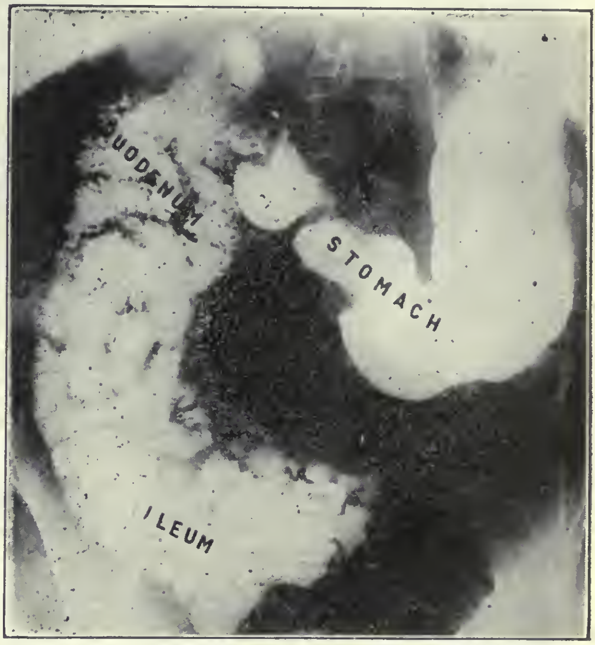

Plate 1. Taken fifteen minutes after ingestion of opaque meal. The duodenum is shown passing directly down on the right side of the abdomen. The duodenum is entirely covered with peritoneum and is freely movable throughout its course.

At the end of twenty-four hours the cecum and ascending colon were practically empty (Plate 4). This part occupied the space between the loop or horse-shoe of the remaining part. The appendix was visualized and very definite tenderness is elicited when it is pressed upon under the screen. When the color was moved by posture or palpation the appendix remained fixed and distress was referred to the site of the appendix.

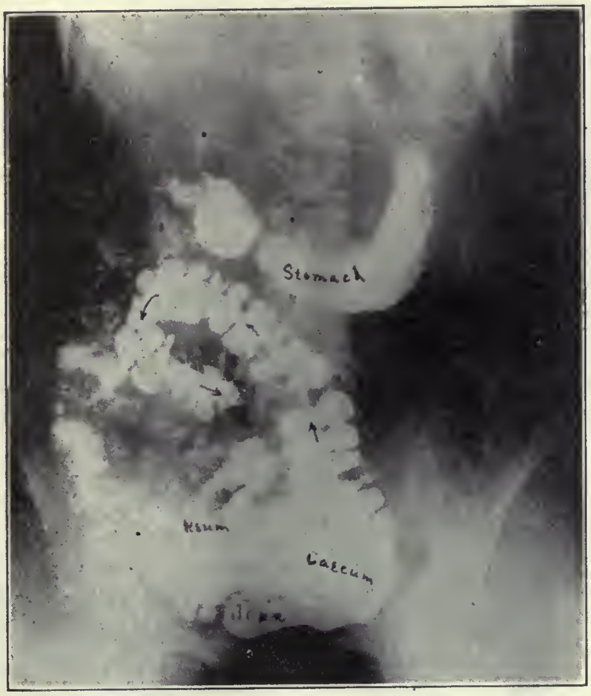

Plate 2. Taken three hours after ingestion of opaque meal. Shows stomach partly empty; coils of ileum still filled in right iliac fossa; cecum is shown in left pelvis with ascending colon passing downward and to the right making loop behind ascending and transverse colon. Terminal loop of ileum shown entering the cecum from its right side.

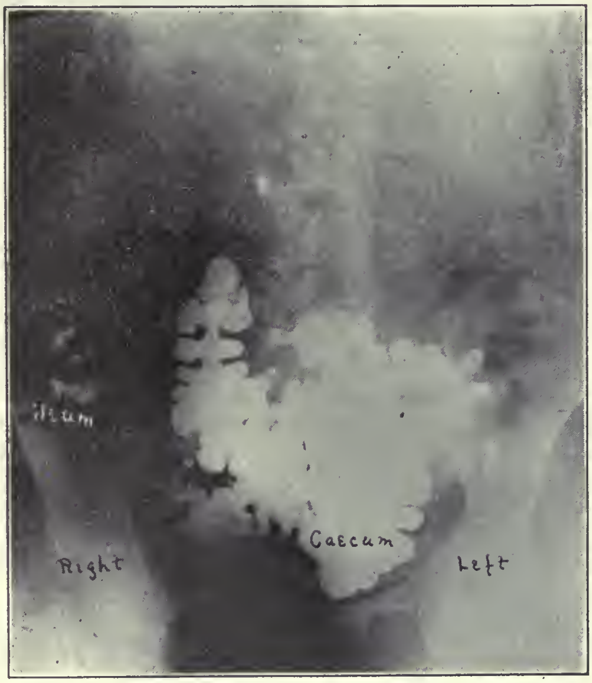

Plate 3. Taken six hours after the opaque meal. Shows flecks of bismuth in the ileum in the right iliac fossa. The cecum is shown in the left pelvis.

At the end of forty-eight hours there was only a small residue of the meal in the rectum. For the next three days the appendix retained the barium residue.

The enema study (Plate 5) shows the course of the colon, the arrows being necessary to demonstrate the conditions on prints which show clearly on plates.

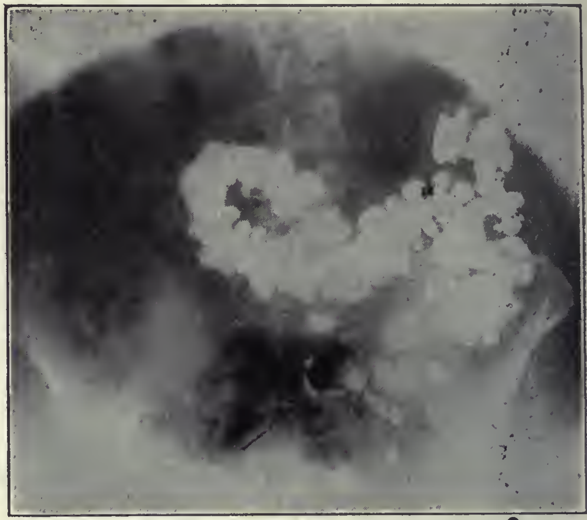

Plate 4. Taken in an exaggerated Trendelenburg posture twenty-four hours after meal. The cecum and ascending colon are empty. The transverse colon drops upward. The arrow points to the appendix which remains fixed and is definitely tender.

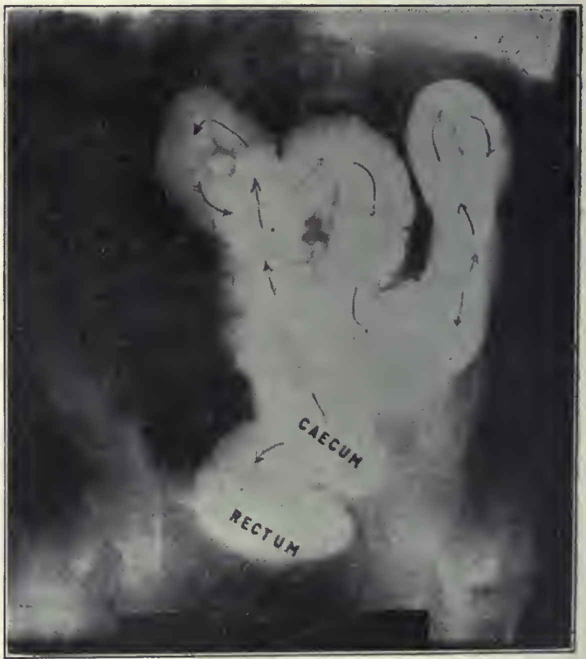

Plate 5. Plate taken after opaque enema. Arrows are used to delineate the course of the colon starting at the cecum.

Conclusions. Clinically the diagnosis of chronic appendicitis would certainly be made except for the unusual location of pain and the absence of tenderness in the right iliac fossa. The roentgen study explains this apparent deficiency and tends to confirm the clinical opinion that there is a pathological condition of the appendix. Operation advised and postponed on account of severe attack of influenza.

Development Rotation of the Colon.

The rotation of the colon which results eventually in the transverse colon crossing the duodenum and depositing the cecum in the right iliac fossa may be arrested in any stage, giving rise to anomalous arrangements of the large and small intestine. The schematic arrangement of the various stages of development are shown by Huntington in Figure I. Photographs are also reproduced of specimens in the Columbia University Museum showing the cecum in different locations. It will be observed that it is characteristic of this developmental defect that the ileum enters the cecum on the right or outer side rather than on the left or inner side and that usually the convexity of the cecum is toward the left side of the body.

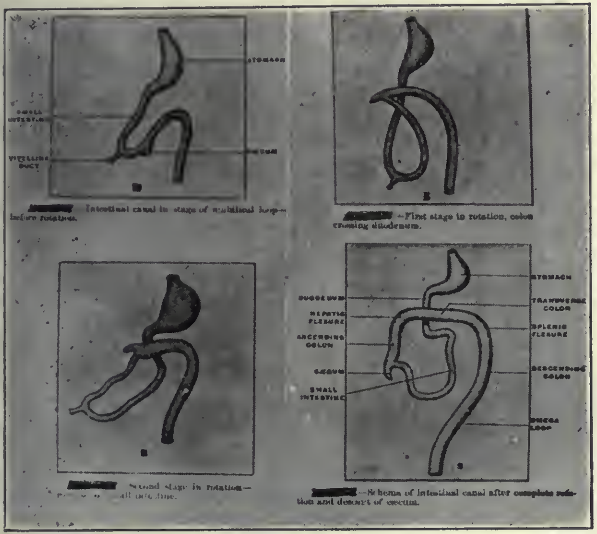
STOMACH
SMALL INTESTINE
VITELLINE DUCT
CECUM
Intestinal canal in stage of umbilical loop—before rotation.
—First stage in rotation, colon crossing duodenum.
Second stage in rotation—
STOMACH
DUODENUM
TRANSVERSE COLON
HEPATIC FLEXURE
SPLENIC FLEXURE
ASCENDING COLON
CECUM
DESCENDING COLON
SMALL INTESTINE
OMEGA LOOP
—Schema of intestinal canal after complete rotation and descent of cecum.

Fig. 1. Diagrams of intestinal rotation (Huntington).

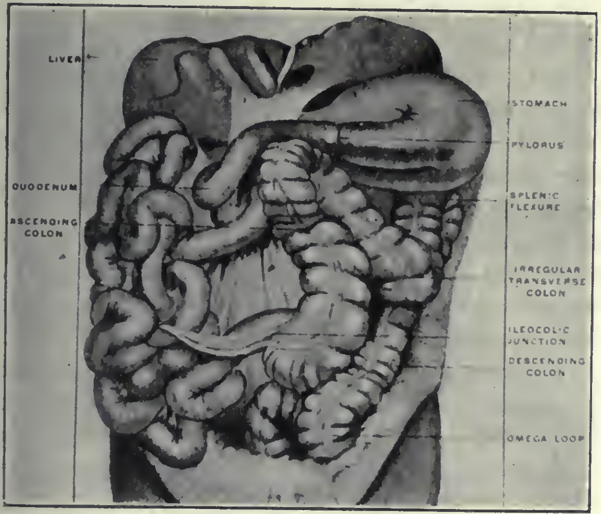

Fig. 2. Complete failure of colon rotation in adult male (Huntington, Columbia University Museum). Note entrance of ileum on right side of cecum.

Review of the Literature.

Lockwood[2] in 1882 cited several abnormal positions of the cecum attributable to arrested rotation. Later[3] he reported two cases in which an unsuccessful attempt was made to open the colon for supposed obstruction, subsequently it being ascertained that in both cases non-rotation was responsible for the difficulty. Armstrong[4] before the American Surgical Association in 1910 reported a case of non-rotation and in the discussion which followed cases were reported by Rixford, by Freeman of Denver, and two by Blake of New York. Malcom[5] in 1911 described a case operated upon for appendix disease in which the colon was found on the left. Gillen[6] reported the results of an extensive exploration made necessary in a subacute appendix disease because of the displacement shown to be a non-rotation. Corlette[7] gave the radiographic findings in a case with gastric symptoms which strongly suggested chronic appendix disease.

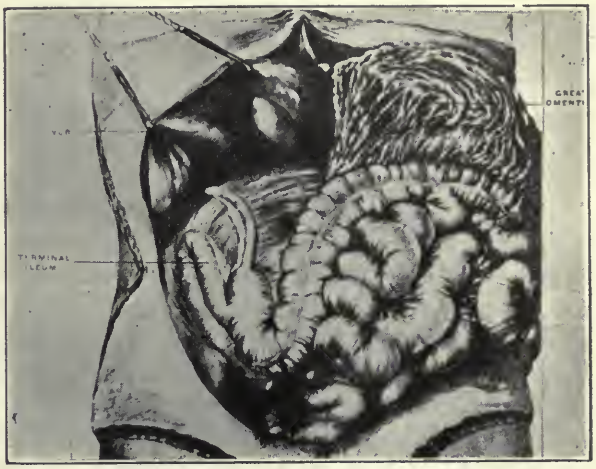

Fig. 3. Failure of rotation, the cecum pointing upward, the appendix under the liver. Note entrance of ileum on right side of the cecum (Huntington).

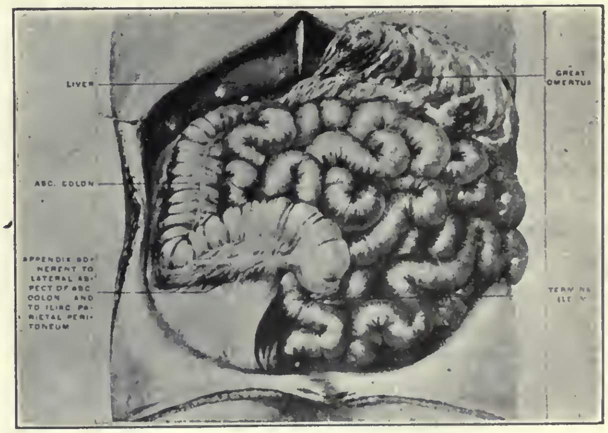
LIVER
GREAT OMENTUM
ASC. COLON
APPENDIX ADHERENT TO LATERAL ASPECT OF ASC COLON AND TO ILIAC PARIETAL PERITONEUM
TERMINAL ILEUM

Fig. 4. Partial non-rotation of colon (Huntington). Note entrance of ileum from below and the right of the cecum.

Downs[8] in 1914 reported a case of non-rotation in which indurated gastric ulcer was demonstrated. LeWald[9] in the discussion of this case referred to two others and subsequently showed roentgenograms of a case. Shrup[10] in a contribution on left-sided appendicitis reports a case operated upon for chronic appendix inflammation. Five cases were reported by the Mayo Clinic[11] in 1911, one with a gangrenous appendicitis, one with chronically inflamed appendix found in the left iliac fossa in spite of definite tenderness in the right iliac fossa, one chronically inflamed appendix containing fecoliths and no other lesion to account for persistent disability, one case with chronic cholecystitis, the condition of the appendix not stated, and one with duodenal ulcer in which the appendix was removed and was supposedly abnormal. R. Fowler[12] in 1916 reported a case of acute appendix disease complicated in the operative procedure by a failure of rotation. He also cites three unreported cases of a similar nature with which he was familiar.

Discussion.

1. It seems probable that the anomaly is not as rare as might be inferred from the scarcity of literature. The condition is easily overlooked even at operation and many of the cases have not been reported.

2. Failure to locate the cecum in its usual site should immediately arouse a suspicion of non-rotation especially if small intestines present themselves in the right iliac fossa. Most frequently the cecum will then be found low down in the midline, even in the pelvis. Less frequently it will be found high in the middle of the abdomen, under the liver or in the left iliac fossa.

3. Left-sided or mid-abdominal pain with symptoms suggestive of appendix inflammation suggests the advisability of a roentgen examination which will positively demonstrate the site of the cecum.

4. Erroneous conclusions may be reached in a roentgen study of these cases, particularly if the failure of rotation is only partial and the cecum is found on the right side of the abdomen. If the end of the cecum is seen pointing upward or inward the inference might be drawn that one is dealing with a lesion and not an anomaly.

5. The fact that sixteen cases out of twenty-two collected from the literature showed appendix inflammation associated with symptoms regarded as sufficient to justify operation suggests that non-rotation increases the natural predisposition to pathological conditions in the appendix. While this is not a proposition that can be proven it tends to justify the inference that we are dealing with an abnormal appendix when in a proven non-rotation case there are obscure abdominal symptoms. Certainly exploration of the appendix should be performed even if another incision is required for the purpose.

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NOTES ON PRE-OPERATIVE AND POST-OPERATIVE TREATMENT.*

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Excepting in emergency cases the treatment of patients before surgical intervention should be such as to render post-operative treatment unnecessary. Obviously this necessitates consideration of the patient as an individual—with respect to his age, his mental and physical condition, etc.—as well as the character of the operation to be undertaken. Very young and also aged patients must alike be viewed as extraordinary surgical risks, and departures from routine methods undertaken accordingly. Especial attention must be given toward securing non-interruption of nourishment. These patients should have selected nourishment administered until the time of the operation by such methods as are indicated by the condition of the digestive organs, and they should not be depleted by the use of drastic cathartics. Body warmth should also be maintained by proper application of heat.

Where a patient displays unusual fear it has been my experience that administration of the anesthetic while he is in bed in his room assists materially in securing quiet narcosis. Children particularly submit to anesthesia much better if the parent or nurse be near when the administration is begun in a familiar room in bed. The nurse who prepares the field of operation should approach young and also nervous patients with tact, and I have found that a smiling nurse, with pleasant conversation and without a rattling, noisy display of razor, enameled basins, etc., can prepare such patients without increasing their distrust. I have had patients so frightened by the aspect of the approaching nurse with razor and other paraphernalia as to decline operation and leave the institution. One woman in fact has since continued to believe that the nurse was going to operate upon her immediately with a razor, and I have been unable to disabuse her mind of that erroneous idea.

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*Read before the November, 1919, meeting of the Staff of the Sts. Mary & Elizabeth Hospital, Louisville, Kentucky.

May I remark here that the nurse's conversation should be general rather than upon her work, i. e., how many preparations she has made for tomorrow, how successful in this class of operations some other surgeon is, how tired she is, or how much overworked all the nurses of the institution are, etc. I find the suggestion often made that a special nurse will be required for the first few days after operation is very discouraging to most patients and causes them to magnify their approaching discomfort. Such suggestions are better made to the surgeon or to some member of the family rather than to the patient.

My experience with aged patients teaches me that those who have been taking small oral doses of pituitrin (usually one drop in water three times daily) do very well under the severest operation.

Generally speaking I find patients unwilling to enter the hospital until the afternoon before the morning of the operation. This requires that cleansing of the patient's intestinal canal be done at home, as I consider it poor practice to purge the patient within the twenty-four hours immediately preceding the operation. Hence, an enema should be given the night before.

For very nervous patients, as well as those whose condition necessitates a local anesthetic, a hypodermatic dose of morphine with atropine is of great benefit. One-eighth grain of the former with 1/150 grain of the latter will usually suffice, and the patient comes to the operating room in a satisfactory condition.

As a routine measure the patient's pulse, temperature, and respiration should be recorded before operation. As an illustration, a patient now in this hospital, with an enormous fracture of the frontal bone, has a pulse ranging from fifty-eight to sixty-five. However, this was an emergency case and there was no record to show whether this pulse was normal or otherwise.

To prevent nausea after the anesthetic, as well as to eliminate the possibility of acidosis, I order one teaspoonful of sodium bicarbonate dissolved in a teacupful of hot water taken half an hour before the operation. I also have the patient take a cup of coffee or tea without cream or milk for breakfast the morning before the operation.

Vaginal douches, preferably of lysol solution, are given to patients upon whom either a vaginal or abdominal hysterectomy is to be undertaken just before the operation, if practicable.

A low enema is given in rectal cases, and the patient permitted to use the commode so as to completely empty the rectum of water. In these cases the administration of morphine before the operation appears to be beneficial in obtaining deep anesthesia without resistance of the patient.

In brain and spinal cord cases the administration of hexamethylenamin for several days prior to operation seems to lessen the danger of infection. This has also proved beneficial in kidney, bladder and prostate operations.

Lavage is practiced before all stomach operations. The condition of the teeth should be investigated and bad infections should receive dental attention before operation. I am confident this often saves the patient a great deal of trouble. The goiter patient requires much individual and special treatment which I cannot undertake to describe, and each case will present a different problem.

I shall not discuss post-operative treatment further than to say that all patients excepting those operated upon for gastric lesions are given water to drink as soon as they want it and can take it. A purgative is not administered until the third day (in rectal cases the sixth day) and then a remedy is chosen to suit the case in hand.

An effort is always made to promote the comfort of the patient, he is permitted to lie on either side or on the back and to have pillows placed around him in such a way as may prove comfortable. Of course, if the operation has been of a nature to require a certain posture, such as gastric or goiter operations, or in peritonitis where the Murphy position has to be maintained, or when the condition of the patient necessitates the Fowler position, the changes in posture which are so pleasant to the patient cannot be permitted.

My patients do not suffer from gas pains now as they did before I adopted the frequent use of soda and water before and after operation, the giving of the nourishment until the time of operation and soon afterward, and the method described of cleansing the intestinal tract.

Non-absorbable sutures are removed on the seventh day and fresh gauze applied to the incision. In abdominal wounds adhesive plaster is not removed from the abdomen but is split in the middle and readjusted with new strips. This saves the patient much suffering.

ABDOMINAL HERNIA.

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Abdominal hernia is more frequent than appendicitis, and excluding tuberculosis, it claims more victims than any other disease that afflicts man. It is estimated that one out of every ten individuals has a hernia of some form, usually inguinal. A person with hernia is barred from all branches of the government service and from municipal police and fire departments.

The earning capacity of such individuals is reduced fifteen to fifty per cent., depending on the location and size of the hernia and the degree of its control with a truss. Many life insurance companies refuse hernia subjects, others reject them unless the hernia is small and easily held by a truss. At best the subject's life expectancy is shortened, his earning capacity lessened, and his usefulness to the community and his family diminished.

Causes and Symptoms.

Heredity, traumatism, and laborious occupations are the most frequent causes of hernia. Kingdon claims heredity in thirty-four per cent. of all cases. Lucas-Championniere believes excessive fat formation is a frequent cause of umbilical hernia. Hernia is three times more frequent in males than in females.

Indigestion, backache, fatigue on the slightest exertion, constipation, and intestinal colic are symptoms accompanying hernia, and are often improperly ascribed to other causes by the patient.

Preformed Sacs.

Coley, Russell, Murray, and others believe that nearly every inguinal hernia, a majority of the femoral, and many of the direct variety, are due to a preformed sac or an obliterated portion of the processus vaginalis. The sacs in the majority of cases of direct and femoral hernia are acquired, although it has been proven that preformed or congenital sacs are sometimes found.

Strangulated Hernia.

Strangulation is most frequent between the ages of forty and fifty. While hernias in adults are usually epiploceles, we have no means of knowing when the sac contains both omentum and intestine. It is because the majority of hernias are epiploceles that strangulation does not occur more frequently. In irreducible omental hernia where there is an occasional descent of small intestine, the prognosis is serious, and there is constant danger of a loop of bowel becoming strangulated at the neck of the sac.

Hernias in children are usually enteroceles, and should strangulation occur the outlook is always grave. Very small hernias are liable to strangulation by the entrance of one or more knuckles of gut into the sac.

Uses and Limitations of the Truss.

Every patient who wears a truss and believes it is properly fitted, knows or should know that it is only a makeshift, that it will not cure his hernia and that there is danger of strangulation at any time should the truss slip while he is engaged in work. He knows also that if his hernia increases, as many do, that he will have to seek further treatment, and it is at this stage that many patients become an easy prey for the charlatan or quack.

The irritation, annoyance, and physical discomfort caused by the truss are very pronounced, especially during the summer months, and at times sufficiently serious to impair the patient's health. Patients often remark that they were unable to do a full day's work until their hernia was cured by operation. Macready, surgeon to the London Truss Society, states that congenital hernia in children under one year old may be cured in fifty-eight per cent. of the cases by the use of a truss, in children from one to five years of age ten per cent. of cures occur, and after that age no permanent cures are obtained from a truss, Jacobson says that a number of patients supposed to have been cured by a truss in infancy have a return of their trouble in adolescence or early manhood.

If the pressure of the truss has been firm, peritoneal adhesions and a gradual increase in the size of the abdominal opening usually occur. It is difficult to adjust the truss to the fat subject so that it will hold the hernia and at the same time afford comfort to the patient. At best a truss is irksome and tends to form adhesions rendering a later operation difficult, consequently recurrence is more frequent where a truss has been worn for a long period previous to operation.

Injection Treatment.

The dangers of the injection treatment for hernia can not be too strongly emphasized. Paraffin is the substance most often employed. Almost always the hernia recurs a few days or weeks after injection. Should it not reappear, it is usually only a question of time until the hard masses of paraffin will induce suppuration, causing so much pain that their removal is required. The paraffin is gradually replaced by a firm mass of scar tissue which has a tendency to undergo malignant change. When the injection treatment has been used, the radical operation is more difficult and the hernia is more liable to recur than in uncomplicated cases. Charlatans and quacks are earnest advocates of the injection treatment, and cases are reported where they have made the injection into the femoral artery, resulting in gangrene of the extremity necessitating a hip-joint amputation.

OPERATIVE CURE OF HERNIA.

Of the many methods devised for the cure of inguinal hernia, I believe the modification of the Bassini operation is the best. Transplantation does not add to the difficulty of the operation under local anesthesia. The patient is out of bed in ten to fourteen days. As a rule patients with unstrangulated hernia should receive a dose of morphine (from one-sixteenth to one-fourth grain) one hour before operation, to allay any restlessness or nervousness.

The sac should always be completely removed, and when cut properly the stump disappears from sight by the elasticity of the peritoneum. The removal of the mesenteric fat will diminish intra-abdominal pressure, lessening the danger of recurrence.

The careful preservation of nerves is an important factor, and one often neglected, in securing primary union and preventing recurrence. The inclusion of nerves, even the minute ones, in the suture, may lead to paresis of the muscles innervated by them, thus explaining the recurrence in certain cases.

The administration of an intestinal antiseptic preceding the operation and during the time the patient is confined to his bed, will materially add to his comfort by preventing gas pains.

ANESTHESIA.

Réclus says the hernia operation is the triumph of local anesthesia. To my mind there is only one contraindication to its use in all forms of hernia, and that is in the case of a patient who does not want it, who for any reason prefers to be asleep during the operation. To this type of patient, for any operation, I always administer a general anesthetic.

Local anesthesia removes the danger from ether pneumonia and renal insufficiency. Every step in the operation that is carried out under general narcosis may be done with local anesthesia. The operation for inguinal hernia is the most successful in the entire field of local analgesia. In strangulation, with the accompanying lowered vitality, it is a safeguard against shock, and it also provides ample time to determine the visibility of the gut. When resection of the gut is necessary, it can be done without additional risk to the patient.

The physician who would use local anesthesia should remember that the successful operation is painless. Patients frequently fall asleep during the latter part of a single or double hernia operation, especially when the sac is extensively adherent and the gentle dissection is necessarily slow. Success depends upon patience, an intimate knowledge of the sensory nerve distribution, and special training in the method. The technique of the injection is always delicate; it varies in each patient, in each operation and in each region. The rapidity, intensity, and duration of anesthesia depend upon the anesthetic and the strength of the solution. Because of the slower appearance of anesthesia with the non-toxic cocaine substitutes, more time must be allowed before beginning the operation. For inguinal hernia, one half per cent. apostheme or a one-half per cent. procain solution is employed for the skin and nerve trunks; elsewhere a one-fourth per cent. is used.

Large umbilical hernias can easily be operated upon under local anesthesia if the sac is opened as soon as the skin incision is made, and the parietal peritoneum anesthetized at the constructing ring. The sac can then be stripped off without the injection of more anesthetic solution. To attempt to anesthetize a large umbilical hernia by local infiltration on the outside of the sac is unsatisfactory, because of the tediousness of the procedure and the large quantity of the solution required.

THE PREVENTION OF RECURRENCE.

Infection is undoubtedly the most frequent cause of recurrence. Coley says that with the use of rubber gloves and the greatest possible care in maintaining an aseptic technique, he obtains ninety-eight per cent. of aseptic healing of wounds.

A truss should not be worn after operation. It has a tendency to cause thinning and atrophy of the muscles and newly formed scar tissue, thus favoring recurrence when it is finally discarded. In cases where the hernia is large and the closure of the opening difficult, the use of an elastic support or bandage for a few months is often recommended.

Extreme old age and organic disease of the heart, lungs, or kidneys were formerly believed to be contraindications to the radical operation, but with a good technique there is practically no contraindication to the cure of every hernia regardless of the age of the patient. Some of the best results in my private practice have been in patients over seventy years old. In over five thousand major operations under local anesthesia at the New York Polyclinic Hospital, there has not been a single death from the anesthetic.

Many physicians have noticed that the percentage of recurrence is lower with local, than with general anesthesia. This is probably due to the fact that the nausea and vomiting which usually follow a general anesthetic, are always absent after local, and there is no strain on the deep sutures.

30 N. Michigan Avenue.

THE TREATMENT OF COMPOUND FRACTURES.*

Francis W. McGuire, M.D.,
Buffalo, N.Y.

In the treatment of compound fractures the resistance of the individual, the virulence of the invading organisms, the character of the wounds of the bones and the soft parts, must be taken into consideration. We have learned from experience that there are certain types in which the wound of the soft parts may be sutured immediately, with very little danger of infection. If we could follow this procedure in all compound fractures, it would be a very happy condition for the individual, but unfortunately we are unable to do so, as some of the wounds are positively infected from the beginning, and it would be a very serious matter for the individual if they were closed. If it were possible to distinguish those wounds that could be closed, and those that should not, this, also, would be a very happy condition for the patient.

I believe at the present time there are a number of wounds that are Dakinized, that might be closed by primary union. No doubt this condition exists principally because of our war experience, not taking into consideration the difference between those wounds that occur in civil life and those that occur on the battlefield. If those treating compound fractures would remember a simple classification, there would be very little, if any, difficulty in deciding which wounds to close and which to Dakinize. The classification I refer to takes into account the method of causation and the amount of destruction to the soft parts. Granting the foregoing conditions are reasonable, it seems the best classification of compound fractures would be, first, those due to indirect violence and second those due to direct violence.

Compound Fractures.

1. *Indirect Violence.*
2. *Direct Violence.*
    a Slight injury.
    b Amputating injury.
    c Compound into joints.
    d Severe injury—large wound, destruction of skin, fascia and muscle, with infection.

In treating compound fractures caused by indirect violence, we find a punctured wound, due to the protrusion through the skin of one or both ends of a fracture of a long bone. This wound has had very slight chance to become infected, and besides there is no death of soft tissue by direct violence, consequently it would seem quite evident that all compound fractures due to this type of violence, can be successfully closed. I might add that it is our practice at the Emergency Hospital to carefully cleanse the skin and wound of this type with tincture of iodine, and close immediately by suture of either silk or silkworm gut, and treat along the lines of a simple fracture. The only reason for enlarging or exploring this type of wound, is in the event of profuse hemorrhage, or the laceration of a nerve or tendon. I do not remember ever having infection following a fracture of this type.

In treating compound fractures due to direct violence, the following sub-divisions should be made: (1) Those fractures in which a slight amount of destruction to the soft parts has occurred—with slight possibility for the introduction of infection. (2) Those in which there is a great amount of destruction of the soft parts, with large wounds, with the possibility of virulent infection being introduced. (3) Gunshot fractures. (4) Compound fractures into the joint.

Regarding the treatment of the first type—they can be treated in the same manner as a compound fracture due to indirect violence, because in this type there is very little destruction of the tissues, and very slight chance of infection. In treating the wounds of the second type, there is present usually a large wound, with more or less of dead skin, fascia and muscle, due to direct injury. In this type of wound, the patient should be anesthetized, and all of the dead tissue, as far as possible, removed, and if the wound is not sufficiently large for proper drainage, it ought to be so enlarged. Then the wound should be Dakinized until such time as it is sufficiently free from infection, and then be closed. The treatment of the fracture, itself, should be by suspension—either in a Thomas or Hodgen splint, as it is more comfortable for the patient, and the dressings are more easily accomplished. The question of the removal of comminuted bone often arises. It has been our practice to remove very little—if any—bone, and especially not to remove any that has periosteum attached to it. In treating this class of case, we never use any retaining foreign material for approximating the fractured ends of bone, as the added traumatism in the presence of infection, cannot help but end seriously in a large percentage of cases.

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*Read before the Cattaragus Medical Society.

I might say in some of the cases of fracture by direct violence, the blood and nerve supply are so severely injured that it is impossible for the distal portion of the limb to live. In all these cases, this condition is usually evident and amputation is necessary. I might also add that in no case is an amputation carried out unless there is total destruction of blood and nerve supply to the distal part.

Gun-Shot Fractures.—In the treatment of this class of fracture the edges of the wound should be dissected out and the wound enlarged sufficiently to replace any displaced bone, and to find out whether any foreign material has been carried in. If we are satisfied at this stage that there is no infection, the wound may be closed and treated along the lines of a simple fracture, but if infection is present, the wound must be enlarged and Dakinized until such time as the infection is overcome.

Compound Fracture Into Joints.—In this class of case the skin about the wound is cleansed with iodine, the joint cleansed with alcohol and ether, and the wound closed until such time as evidence of infection appears. In treating wounds of joints in this way, I have often obtained a primary union, where it would seem very probable that infection might occur. If infection does appear, the joint is opened and passive movement of the joint is used several times daily. Moist dressings of saturated solution of boracic acid, or 50 per cent. of grain alcohol are used over the joint.

470 Franklin Street.

Surgery in the Aged.

Except for the greater need of speed and precision, surgical operations in the aged are, in their technical performance, the same as in younger individuals. The surgical therapy of the aged differs from that applied to younger people in the *election* and *selection* of operation, in the preparation for it, in the choice and administration of the anesthetic and the added care needed to preserve bodily heat and heart function during operation, and in the after-care.

There are individuals of seventy as feeble, physically and mentally, as many at ninety, and *per contra,* one often sees people of eighty as vigorous and healthy as the average at seventy. Medically, therefore, we should consider as "aged" those who are very old in their tissues and functions no matter how old they be in years.—W. M. B.

TREATMENT OF CONGENITAL CLUB-FOOT.

Orville R. Miller, M.D.,
Louisville, Ky.

Club-foot is a term popularly used to designate an inversion of the sole of the foot, with usually an accompanying contraction of the tendo-achilles, to a greater or less extent so that the patient's weight is thrown on the outer side of the foot, and if there be present a marked contraction of the tendo-achilles, the weight will be borne on the anterior portion of the foot on the outer side, at about the juncture of the cuboid and the fifth metatarsal.

This is not an unusual orthopedic condition, as is shown by statistics reported by R. W. Lovett of the Children's Hospital of Boston. In 6,969 orthopedic cases, 488 were of the club-foot variety, showing in this series, that of all orthopedic cases presenting themselves for treatment at this hospital, about 7% were of the club-foot variety. Royal Whitman reports 3,453 cases of club-foot from records of the Hospital for Ruptured and Crippled, New York. Of these, 1,650 were congenital and 1,803 were acquired. From these figures we see that approximately 45% of club-foot cases are congenital, and that congenital club-foot makes up approximately 3% of all orthopedic affections.

The etiology is somewhat obscure, but a faulty position of the limb during intra-uterine life, is supposedly the cause. Pressure is made upon the foot in such a way as to cause a bending and twisting in the head and neck of the astragalus toward the inner side of the foot. Other bones are pushed out of proper relationship with each other. The lateral arch of the foot is concave and exaggerated, the inner border is shortened, the outer border elongated and convex, the foot shortened withal, and stubby, justifying the name of "club-foot." So the pathology, then, is one of relationship rather than one of disease. As the patient grows older, the common tendon of the extensor digitorum longus muscle becomes permanently lengthened, as are also the tendons of the peronei muscles. While at the same time there is a shortening of the tibialis anticus and posticus (inverters of the foot) depending upon the amount of contraction present in the tendo-achilles. There is also usually a very marked contraction of the plantar fascia.

The treatment of these cases may be simply manipulative, or mechanical or operative. It is desirable to institute treatment as soon as possible after the first week of life. In the very early cases the manipulative treatment may be used. It consists of a daily manipulation of the foot for a period of about 15 or 20 minutes, forcing it into an over-corrected position. This mode of treatment may prove very successful if persistently carried out. It is somewhat unsatisfactory as a rule, however, since it is almost impossible for the physician to see the patient daily over a very long period of time and if the task be left to a nurse or to the parents, it will frequently be neglected. A much surer way is that in which constant support is given the foot, holding it in position between manipulations.

Very young patients do not require an anesthetic, the parts being soft and easy to stretch. The foot may be forcibly stretched and twisted until there is a complete transformation of the inversion to an eversion of the plantar surface. While the foot is held in this position, cotton or several thicknesses of flannel and a plaster of Paris bandage are applied. The leg should be flexed to a right angle with the thigh and the plaster applied to a distance of about three or four inches above the knee. In this manner, leverage is afforded which will prevent a rotation of the plaster about the lower leg and will maintain more securely the position of the foot. The varus deformity is first overcome before any attempt is made to stretch or tenotomize the tendo-achilles. In this manner the deformity existing in the neck of the astragalus is corrected, the bones are pushed back in the direction of the position which they maintain normally and the contracted fascia and tissues become elongated. This plaster may be allowed to remain for a period of one week, when it may be removed, the foot stretched again, everted to a greater extent and plaster reapplied as before. This performance is repeated until the foot of its own accord maintains its position of marked eversion without the support of the plaster bandage. A subcutaneous tenotomy of the tendo-achilles may be done now or the tendon may be forcibly stretched and plaster applied, which maintains a position of marked calcaneo-valgus. This plaster is allowed to remain for a period of about one week when it is removed, the foot forcibly flexed dorsally and plaster reapplied. This is continued at weekly intervals until the tendon is thoroughly stretched and the foot of its own accord maintains a position of marked calcaneo-valgus. The over-correction is very necessary because of the tendency toward recurrence of the deformity. After complete over-correction has been accomplished, the patient is still allowed to wear plaster over a period of several months in order that the stretching of the soft parts may be permanent and to allow a contraction to take place of the peronei and the extensor digitorum longus muscles to compensate for the elongation of their tendons.

Neglected cases of long standing, and those which have received treatment but have had a recurrence of the deformity, are usually not so amenable to this method of treatment. The bones having become larger and more completely ossified, the contracting tendons having become larger and stronger in the one case and the large amount of inelastic cicatricial tissue following repeated wrenchings in the other case, make operative intervention necessary.

There are many operations in use at the present time. Those most commonly used, however, are those of Phelps, Cook, Albee and Hoke. To the writer, the Albee operation of bone graft seems most efficient. The technic is as follows: On the night previous to the operation, the foot and lower leg is thoroughly washed with soap and warm water. After having been dried with a clean towel, pieces of gauze wrung out of 50 per cent. mixture of alcohol and water, or preferably, a weak solution of bichloride of mercury, are applied from the toes to the knee and held in place with gauze bandage. At operation, a tourniquet is applied above the knee and the field of operation painted with iodine. Now, a subcutaneous tenotomy of the tendon Achilles is performed to overcome the equinus. Next, a U-shaped incision is made on the inner side of the foot in the region of the astragalo-scaphoid articulation, the apex of the incision pointing and extending well down toward the great toe. The flap of skin and fascia is dissected up exposing the scaphoid bone. A thin, sharp chisel about half an inch wide is inserted into the wound and the scaphoid bone divided into an anterior and a posterior half. The plantar fascia is divided through the same wound. The foot is stretched into an overcorrected position while measurement with calipers is made of the distance between the fragments of the divided bone. A wedge of bone is taken from the tibia in such a manner that its base corresponds with the measurements just made. This graft is placed between the portions of the divided scaphoid and sutured in place with chromicized catgut or kangaroo tendon. In young children, the bones can be pierced by a cervix needle, but in older subjects it is frequently necessary to bore holes large enough to admit the passage of the suturing material. The soft parts are sutured over the graft and the skin closed with catgut wherever the edges can be approximated. Following the lengthening of the inner border, it is sometimes impossible to coapt the edges of the skin in that portion of the incision nearest the toes. Wherever this occurs, the wound is left to granulate. The foot is laced in a position of overcorrection and plaster of Paris applied to maintain this position for a period of about six weeks. At the end of this time the plaster may be removed, the leg bathed in alcohol, a fresh dressing applied to the wound and the foot again put up in plaster for a period of six weeks longer.

By this operation, the foot is left in a more nearly normal appearance than by other operations. The foot is permanently lengthened at its inner border so that the patient is saved the embarrassment of wearing mismated shoes because of a shortening on the affected side as is the case following Cook's operation. By Cook's method, a wedge or bone is removed from the outer side of the foot in the following way: The foot and leg having been previously prepared, an incision is made on the outer side in the region of the calcaneo-cuboid articulation. With a broad, thin chisel, a division is made of all bones of the tarsus in a straight line to the inner side of the foot. The chisel is withdrawn and another division of all bones is made in such a way that it will meet the other at the inner border of the foot. The wedge is removed, the foot overcorrected and plaster applied. By this method, the concavity on the inner side is straightened but the foot is shorter than normal.

The Phelps' operation consists of a division of all tissues in a straight line down to the bone. The field having been prepared, all tissues over the astragalo-scaphoid joint are divided by one sweep of the scalpel. The incision should extend far enough into the plantar region to divide the plantar fascia. The foot is forcibly stretched into an overcorrected position and the wound left gaping. A dressing of fluffed gauze is applied and then plaster to maintain the position. By this method, the foot is lengthened and very satisfactory results are obtainable. However, the tendency toward recurrence is much more marked following this operation because of the contractions of the cicatricial tissue. Unless the patient wear some kind of mechanical appliance over a very long period of time to offer constant resistance to the contractions, the deformity may recur. Such is not the case, however, following the Albee bone-graft. On the contrary, the contractions of the cicatrix are of little consequence and it is not necessary for the patient to wear any sort of appliance over a long period of time.

The operation devised by Hoke, of Birmingham, Ala., consists of a subcutaneous osteotomy of the neck of the astragalus following a thorough stretching of the plantar fascia and tendo-achilles, or a subcutaneous fascia and tenotomy. The foot is overcorrected and plaster applied.

The after-treatment is much the same regardless of the method employed. After the patient has worn the first plaster dressing for about six weeks, it is removed; the wound is dressed with some dry dressing if there has been healing by first intention, or if granulations be present, silver nitrate is used to cauterize them, the wound is dressed with gauze and plaster applied to maintain a position of overcorrection. This is allowed to remain for four to six weeks longer. A cork or wooden wedge may be incorporated in the plaster over the sole of the foot which will raise the outer border of the foot about one-half inch higher than the inner border. The patient is allowed to go about freely walking on the plaster which has been made of great thickness over the sole.

At the end of the six weeks, a club-foot brace such as that devised by Bradford and Lovett or the brace devised by Dr. Henry Ling Taylor is given the patient. Ordinarily, it will be necessary to have shoes made especially to fit the case. They are made of soft leather, are lightly constructed and are open well down toward the toe to permit of easy slipping on and off over the foot while the brace is being worn. The shoe is laced up the front, has a broad, low heel and is roomy and comfortable. The patient should be kept under observation during the several months that the brace is being worn and for some time following its removal. At the end of about six months, the brace may be removed and the patient allowed to wear shoes with a low heel and a broad toe. If at any time a tendency toward recurrence is noted, the outer border of the shoe is raised one-eighth to one-fourth inch higher than the inner side so as to increase the valgus. In extreme cases, it is sometimes necessary to perform a secondary operation of shortening the tendons of the peronei muscles or the extensor digitorum longus. This is in cases, however, in which the lengthening of their tendons is such that the muscle fibers are unable to contract to an extent which will restore the equilibrium of the foot.

Congenital club-foot is a somewhat resistent deformity and requires patience and persistence on the parts of both patient and surgeon. Nevertheless, good results usually follow treatment carried out along the lines indicated.

809 Starks Bldg.

A LARGE PERIRENAL ANGIOSARCOMA.

Solomon Wiener, M.D., F.A.C.S.,
New York.

Paranephric tumors formed one of the subjects under discussion at the recent twenty-eighth congress of French surgeons. Dr. Paul Lècène made a report based upon 113 authentic observations of these growths; 96 of these were operative cases, and 17 were based upon autopsies. He stated that these tumors are found upon either side, and at every age. Apparently they occur more frequently in the female sex, 70% of the cases of his series being in women. The tumors cause very little if any functional disturbances, their growth is slow, insidious, and usually painless. Few or no signs of compression are present, except in the very advanced stages.

The tumor is usually paramesial. From the diagnostic standpoint it is important to determine the anatomic seat of the growth and the functional capacity of the kidneys. In determining the location of the original site of the tumor Lècène recommends careful percussion, dermographic tracings, and especially the location of the tympanitic note of the overlying colon, aided by inflation of the bowel.

Testing the functional capacities of the kidneys is important not only from the diagnostic standpoint, but also because at operation it is frequently necessary to sacrifice one kidney.

In operating he gives preference to the transperitoneal route over the ilio-lumbar. The operative mortality is given as 40%. As for the end-results, only one case out of the operative series of 96 was alive and free from recurrence after six years.

The findings in our case in the main bear out these conclusions.

Jennie E., aet. 37 years, surgical number 195277, admitted to the service of Dr. Hiram N. Vineberg at Mount Sinai Hospital, New York, September 27, 1919.

Chief Complaints: Patient has noticed a "lump" on the right side of her abdomen for one year; sudden onset of pain in the above location six days ago.

Past History: Had operation for prolapse and appendicectomy nine years ago. Married twelve years; one child four years old; no abortions. Menstruation began at twelve, occurring every four weeks, lasting three days, painless.

Present Illness: About one year ago the patient first noticed an abdominal mass. This gave no symptoms until six days ago when she experienced a severe attack of right-sided abdominal pain with vomiting. The pain gradually subsided; since twenty-four hours before admission it has again become severe. She has been constipated for three weeks, but has noticed no urinary disturbance.

Physical Examination: Somewhat poorly nourished woman. The right side of the abdomen is visibly more prominent than the left. Extending from above the umbilicus down to the level of the anterior superior spine of the ilium, on the right side, there is a firm, somewhat lobulated mass. This gives the impression of being very close under the abdominal wall. The mass extends well out into the flank, is tender, and slightly movable from above downward, as well as from side to side; there is dulness on percusion. The liver, spleen, and kidneys are not palpable. Vaginal examination shows an anteverted, movable uterus, not enlarged; no extrauterine pelvic masses palpable.

Cystoscopy (Dr. A. Hyman): Bladder and ureteral orifices normal; both ureters catheterized; no obstruction. Right kidney—normal flow of slightly cloudy urine; no indigo-carmine excretion in thirty minutes. Left kidney—normal flow of cloudy urine; fairly strong indigo-carmine excretion in thirteen minutes. Examination of the catheterized specimens showed on the right side numerous epithelial cells, urea 3 grams; on the left side, numerous epithelial cells, an occasional red blood cell, urea 2.5 grams.

A thorium pyelogram of the right kidney showed the pelvis displaced downward and to the left, corresponding in a general way to the site of the tumor.

The right ureter catheter was left *in situ* when the patient was returned to bed after the cystoscopy; indigo-carmine in good concentration appeared in the urine from this catheter one hour after its injection (as opposed to its appearance in thirteen minutes from the left side). This delayed excretion was of course highly suggestive of obstruction of the ureter.

Pre-operative diagnosis: Retroperitoneal tumor, probably renal in origin.

Operation: Right rectus muscle-splitting incision. On opening the peritoneum a huge tumor presented. It proved to be retroperitoneal. The most prominent portion presented under the transverse mesocolon to the right of the median line, being in contact with the anterior parietal peritoneum. The transverse mesocolon was incised, exposing the tumor itself. Fortunately it proved to be distinctly encapsulated, the capsule consisting of several layers of dense fibrous tissue. The outer capsule was accordingly incised and the tumor gradually enucleated and developed. This procedure was fraught with very considerable difficulty as the tumor proved to be exceedingly vascular, and there were dense adhesions between it and the mesentery, as well as the intestines, both large and small. The enucleation proceeded, largely by blunt dissection, numerous large vessels entering through the capsule being clamped and ligated. Oozing was moderate and controlled by packing. When the dissection was about half completed the kidney was found to be situated near the upper pole of the tumor and intimately associated with it. The final pedicle, as it developed deep in the lumbar region, consisted of the renal vessels and ureter. It was found impossible to separate the pelvis of the kidney from the growth without leaving behind considerable tumor elements. The renal vessels and ureter were accordingly ligated with heavy silk, and the kidney and tumor removed *en masse*. Because of the enormous raw surface it was deemed inadvisable to close the wound without drainage, and a large gauze drain was placed in the bed of the tumor and brought out of the upper angle of the wound.

Although the loss of blood throughout the operation had been slight, the patient was by this time in extreme shock. Accordingly, while an intravenous saline infusion and hypodermatic stimulation were administered, the abdominal incision was closed as rapidly as possible with through and through sutures.

Specimen: A tumor the size of an adult head, the kidney being intimately associated with its upper pole; the kidney parenchyma itself not invaded. The greater part of the tumor was solid, there being several large cystic areas in its lower portion. On section the growth was yellowish red in color, friable and very vascular.

Pathologist's Report: Peri-renal angiosarcoma (Dr. F. S. Mandlebaum).

The subsequent course of the case was uneventful. The packing was removed on the eighth day. Eighteen days after operation the patient left the hospital in good condition, with wound firmly healed. Two months after operation she had remained well, and was without signs of recurrence. In view of the advanced stage of the growth, and its malignant nature, the ultimate prognosis is of course very poor.

The question whether these tumors should be operated upon transperitoneally or by the iliolumbar route is an open one. This will depend somewhat upon the technical skill and experience at the disposal of the individual operator. It would seem to me that in the above case the transperitoneal route was the more feasible one. The most difficult and dangerous step of the operation was the separation of the dense adhesions between the tumor and the mesentery and intestines. Surely this was easier technically, and safer, when the field was close to the abdominal wall, than it would have been at the extreme depth of a wound made through the lumbar region. With an abdominal incision the separation in the depths is merely between tumor and the muscular tissues of the back. This can be accomplished rapidly by blunt dissection, with the assurance that important structures will not be damaged.

A CASE OF BILATERAL TUBAL PREGNANCY.

G. S. Foster, M.D.,
Surgeon to the Notre Dame Hospital, and
F. J. Pherson, M. D.,
Assistant Surgeon to the Notre Dame Hospital,
Manchester, N.H.

The subject of tubal pregnancy is one which always interests the medical profession, because of its not infrequent occurrence, and the dangers inherent in its development.

In reviewing the literature, it seems rather difficult to sum up accurately the frequency of occurrence of tubal pregnancy. Authors vary much in their conclusions on the percentage.

In reviewing the etiology and gross pathology, opinions seem not to lack a variance. We therefore decided that possibly the better method of obtaining statistics regarding the number of bilateral tubal pregnancies occurring in this country during the last decade, would be by writing to all of the larger clinical centers.

Our motive in doing this was the personal interest aroused by the case herein described. This is a true bilateral tubal pregnancy as proven by the microscope. It was the first case of its kind which had been seen at the Notre Dame Hospital as found by a review of the records. Our interest was further augmented by the lack of mention of this condition in the standard text-books.

We believe this case will be of interest to others, and that a tabulation of the results of our numerous inquiries will assist in properly recording this apparently infrequent pathological entity.

Case Report.

Referred by Dr. F. J. Pherson. No. 19438.
November 8, 1919.

Mrs. B. Native American. Age 39, housewife. Final diagnosis: Tubal pregnancy, right, ruptured; tubal pregnancy, left, necrotic.

Family History.—Father living, age 56, well and strong; mother died at 70, apoplexy; one brother, well and strong; two sisters, well and strong.

Past History—Mumps, rubiola, pertussis, varicella, scarlatina in childhood. Thyroidectomy, four years ago. Dilatation and currettement one year ago. Venereal infection denied. Has leucorrhea for 15 years, slight. Drinks tea and coffee.

Began to menstruate at the age of 14; has always been regular, every 26 to 28 days; no pain; would flow about two days (scant) dark red blood, no clots. Was married at 28 years, menstruated regularly after marriage. Has never been pregnant previously.

Present Illness.—Has always been well and strong. First felt pain in lower part of abdomen two days ago; it grew very severe last night, and she had a chill lasting most of the evening. No headaches. Bowels regular, micturition normal, sleeps poorly (very restless); appetite good. This pain came on very suddenly, and was so severe it "doubled her up" at times. She took salts and as a result has had numerous watery stools. Twenty-four hours ago, this abdominal pain grew much worse. Had a bad chill three hours ago. Occasional vomiting; nothing characteristic in vomitus; it did not relieve the pain. All during the day has been greatly distended. Has passed a small amount of gas infrequently.

Physical Examination.—Well developed and nourished. Head, neck, scalp, ears, nose, throat, teeth, lungs, negative. Is extremely nervous, cannot keep hands and feet quiet. Right eye very prominent. Pronounced bulging from socket. Left eye, slight ptosis. Circular scar on neck from the thyroidectomy 4 years ago. Heart beats 118 per min; no mumurs; the rhythm normal. Abdomen markedly distended; tenderness and muscular rigidity very pronounced; marked tympany. Temperature 97°; pulse 128; respirations 28.

Vaginal Examination.—Rather profuse mucopurulent secretion from external os. No blood-staining. Cervix not lacerated. Perineum and bladder not altered. Fundus of uterus not felt because of extreme distention. Uterus freely movable. No masses felt, but because of the distention, results of this examination were not entirely satisfactory. Pre-operative diagnosis not made. Ruptured appendix or volvulus suspected.

After consultation with Dr. F. J. Pherson, it was advised that the patient be removed to the hospital at once. Owing to the board-like rigidity of the abdomen, there was a question as to the exact diagnosis, but it was agreed that there was some abdominal condition that required immediate attention.

Even in the face of the urgency it was decided not to operate for twelve hours as we desired to reduce the pulse rate and nervous tension if possible.

November 9, 1919.—Operation at Notre Dame Hospital: Extirpation both tubes and ovaries; drainage. Patient went through the operation very well. Returned to bed in fairly good condition.

Pathological Findings.—Right lower quadrant of abdomen filled with dark bloody fluid and some clots. Right tube ruptured and a small *piece* of tissue free in the abdomen. Right ovary entirely destroyed. Left tube greatly distended, and surrounded by adhesions. Left ovary very sclerotic. Tubal drainage instituted.

Microscopical Examination.—Section showed multiple areas of glandular tissue markedly compressed by a large amount of fresh blood, extracirculatory. Decidual tissue infiltrated by many round cells taking a blue stain with many marked areas of free blood. Both sections showed the presence of decidual tissue.

Pathological diagnosis.—Bilateral tubal pregnancy; ruptured on the right side; necrotic on the left side.

Laboratory Findings.

Blood.

Hgb. 90
R.B.C. 4,384,000.
W.B.C. 7900.
Polys. 70.
S. Mon. 22
L. Mon. 4.
Eos. 4.

B.P.D. 120s. 150 M.M.

Urine.

Straw; turbid.
Reac. acid.
Alb. trace.
Sugar—None.
A few fine granular and hyaline casts.
Renal functional test—30 per cent. at end of 1st hour.
Three consecutive Wassermann tests negative.

The patient was discharged from the hospital November 26th.

Collaborative Case Reports.

Case 1.—Vancouver General Hospital, Vancouver, B.C., Hospital No. 81347. Reported by Dr. J. J. Mason. Operation July 7, 1919. Extirpation of both tubes and ovaries. Pre-operative diagnosis: Fibroids of the uterus.

Post-Operative Diagnosis: Ruptured left ectopic pregnancy. Likely right ectopic pregnancy.

End Results: Uneventful recovery.

Case. 2.—Cook County Hospital, Chicago, Ill., Hospital No. 29. Reported by Dr. Henry F. Lewis. Operated upon by Dr. Bertha Van Hoosen.

Operation: May 4, 1918. Salpingectomy (bilateral).

Pre-Operative Diagnosis: Acute recurrent appendicitis; acute recurrent cholelithiasis. (Stone in cystic duct).

Post Operative Diagnosis.—Tubal pregnancy (bilateral).

End Results: An abscess complicated convalescence, but discharged improved June 4, 1918, at own request. Wound not quite healed.

Case 3.—Cook County Hospital Chicago, Ill. Hospital No. 161. Reported by Dr. Henry F. Lewis. Operated upon by Dr. D. N. Hillis.

Operation: August 26, 1919. Salpingectomy (bilateral).

Pre-operative Diagnosis: Chronic salpingitis.

Post-operative Diagnosis: Tubal pregnancy (bilateral).

End results: Did well for 5 days, then developed temperature of 102.4 degrees with pulse of 112. Anasarca. Failed rapidly and died 11.45 A. M. September 2, 1919.

Coroner's autopsy confirmed diagnosis made at operation.

Case 4.—Jefferson Hospital, Philadelphia, Pa. Hospital number not given. Reported by Dr. Alfred Heineberg. Operated upon by Dr. Alfred Heineberg.

Operation: June 18, 1919. Salpingectomy (bilateral).

Pre-Operative Diagnosis: Not made.

Post-Operative Diagnosis: Bilateral tubal pregnancy.

End Results: Uneventful recovery.

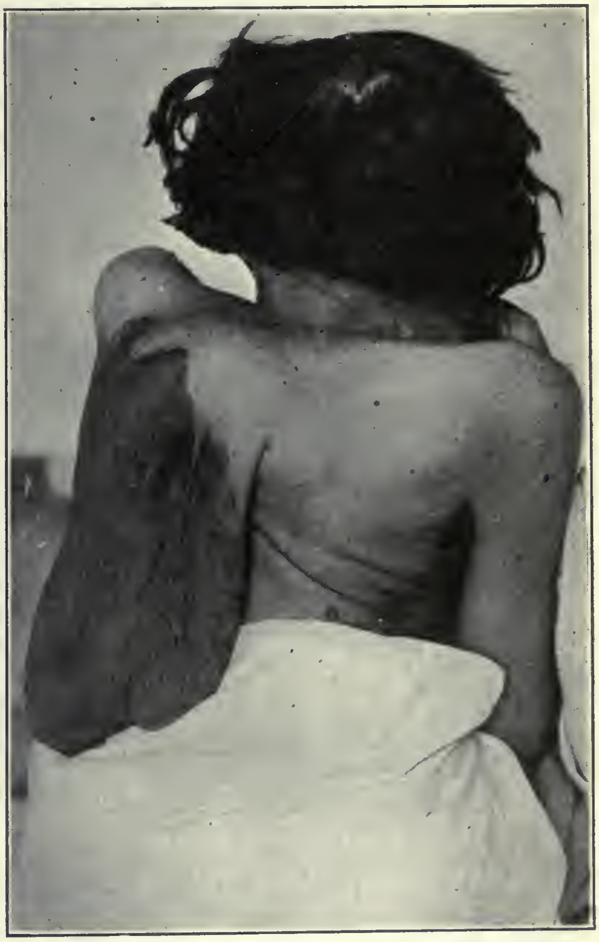
MOLLUSCUM FIBROSUM. A CASE REPORT.

Joseph L. DeCourcy, M.D.,
Cincinnati, O.

"Molluscum fibrosum is an overgrowth of the fibrous tissue of both the skin and subcutaneous structure. It may be limited or widely extended; it may appear as an infinite number of nodules scattered over the entire body, or as hanging folds of fibrous tissue in certain areas" (Da Costa).[1] That the affection is a rare one goes without saying when we consider the comparatively few cases that have been reported in the literature, among the most interesting being those by Chetti,[2] Greene,[3] Anthony,[4] Harper,[5] Gill,[6] Hadda[7] and Sauers.[8] In the case described by Chetti the pendulous mass, when removed, weighed sixteen pounds, ten ounces.

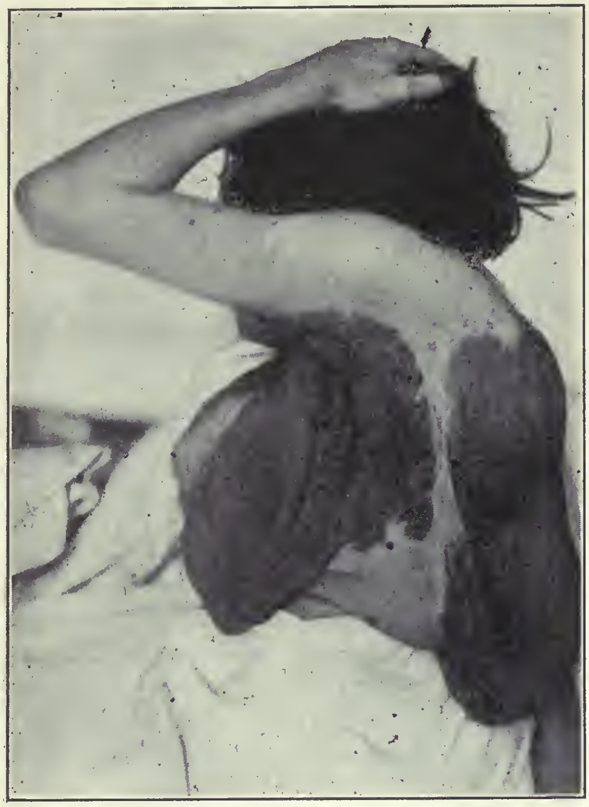
It is a rare privilege, therefore, that I have the opportunity of presenting the following case report:

Miss G., age 23, has suffered from a tuberculous spine since early childhood, which has retarded her growth and caused considerable deformity. About eighteen months ago a flap of tissue began to form over her left shoulder and another just posterior to her left breast. These flaps of tissue have become progressively larger and hang as heavy sacks from the patient's side and back. More recently, about one year ago, small hard nodules, varying in size from peas to hen's eggs have appeared over the entire body, being distributed more uniformly over the back and chest. These nodules, as nearly as could be calculated, were about 4,000 in number and for the most part pigmented a dark brown. The flaps also contain the peculiar pigment as seen in the photographs.



Examination of the posterior flap when removed revealed a mass of tissue weighing about five pounds. Microscopical examination showed a hyperplasia of the connective tissue with hypertrophy of the papillary layer of the corium. Aside from these the tissues seemed to retain their normal appearance. Neither muscle nor nerve fibers were found. These findings seem to agree with those of Brickner[9] which follows:

"The chief elements are: An absence of hyperkeratosis, a moderate degree of hypertrophy of the prickle-cell layer, an intact basal cell layer, and hypertrophy of the collagenous tissue with atrophy of the elastic fibers, an increase in cellular elements and bloodvessels of the corium, and an absence of nerve fibers."



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A CASE OF PERSISTENT SINGULTUS CEASING AFTER THE REMOVAL OF INFECTED TEETH.

Ray R. Reed, D.D.S.
Chief of the Dental Department, Jones Clinic,
Bay City, Michigan.

Case No. A-912.—A man 67 years old with a complaint of hiccoughs which had been continuous for one week. Physical examination revealed: a myocarditis of the second degree; a few scattered râles in both lungs; tenderness over the gall-bladder and appendix; enlarged prostate and a right and left inguinal hernia. The Wassermann reaction was negative. Urinalysis showed a fourth degree of albuminuria and a few pus cells. The blood showed a leukopenia. The dental examination showed a very advanced degree of pyorrhea. The gums were exceedingly hypertrophied. The résumé set down on the day of examination was as follows: chronic cholecystitis with stones, chronic appendicitis, bilateral hernia, teeth as foci of infection.

The patient was advised to have the upper right lateral incisor, first bicuspid, and the three molars removed; also the upper left bicuspids and the first and second molars.

On the following day, the teeth on the right were removed under novocaine anesthesia. Excessive hemorrhage occurred, even on the insertion of the needle. Immediately after the removal of the teeth, and before the patient had left the chair, the hiccoughs had stopped. He was instructed to return in three days. He stated then that the hiccoughs had returned the morning following the extraction. The other bad teeth were removed and the patient was instructed to return in a week. On this visit, his complexion and general appearance were greatly improved. The hiccoughs had completely disappeared about twelve hours following the last extraction.

I cite this case on account of its peculiarity. There evidently was an irritation to the phrenic nerve. This irritation was, it seems to me, due to the toxins from the infected teeth. The fact that after the first extraction there was a temporary cessation of the hiccoughs may be explained by the extreme amount of hemorrhage which followed. Sufficient toxins were probably lost in this way to relieve the irritation of the phrenic nerve. The fact that there was complete relief and that there has been no recurrence since the removal of the infected teeth is convincing to me that this case was primarily of focal origin.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

JUNE New York 1920

AMERICAN PHYSICIANS AND THE HALL OF FAME.

A few weeks ago the newspapers published the names of eighty-seven men and four women nominated for election this year to a place among America's immortals in the Hall of Fame. The group of "physicians and surgeons" thus nominated consisted of the following names: Frank Abbott, William Tillinghast Bull, John Murray Carnochan, Charles T. Jackson, D. D. Palmer, Charles E. De Medici Sajous, William Shippen, Jr., and Lyman Spalding.

Probably very few physicians will even recognize all of these names. We had to appeal to Lieutenant-Colonel Garrison in the Surgeon-General's Library to discover who were Frank Abbott and D. D. Palmer.

Frank Abbott appears to have been a dentist who did some work on tumors of the jaws and teeth, but is not specially known and certainly was not as important in the history of American dentistry as John H. Riggs, of "Riggs' disease," W. D. Miller, the founder of dental pathology, or Edwin H. Angle, who brought order into the science of malocclusion. *John Murray Carnochan* was a bold and original New York surgeon whose most active period was from 1850 to 1870; he died in 1887. *William Tillinghast Bull,* also a New Yorker, was of a later generation and is vivid in the memory of many of us. He, too, was an accomplished surgeon, and "a prince among men." But as representatives of surgery neither Carnochan nor Bull deserves to be considered before Nicholas Senn or Samuel D. Gross—or, indeed, before Valentine Mott, Nathan Smith, Wright Post or John and John C. Warren.

Daniel David Palmer was the author of "The Chiropractor" and presumably the founder of the chiropractic cult. He would be about as appropriate for the Hall of Fame as Minnie Palmer, the actress of bygone days, or Palmer of "Black Crook" fame! *Charles E. de Medici Sajous* published a treatise on throat and nose diseases in 1885. He belonged to that galaxy of earlier American rhinologists and laryngologists to whom we referred last month, and he was not the greatest of these. (Another Charles E. deMedici Sajous, editor, and author of a compendious work on the ductless glands, is still alive.)

William Shippen, Jr. in 1762 established a course of lectures in anatomy and didactic operative surgery and three years later he inaugurated the first systematic course of instruction in obstetrics in America. *Lyman Spalding,* a generation younger than Shippen, and a protégé of Nathan Smith, was an ardent anatomist and versatile in various fields of medicine, notably infectious diseases and prophylaxis. He conceived the importance of a National Pharmacopoeia, established this institution in the face of many difficulties and, almost single-handed, prepared the first edition.

Of the eight names thus proposed as medical representatives for the Hall of Fame only one, that of *Charles T. Jackson,* is associated with a great contribution to medical science and human welfare; and it is difficult to see how the name of Jackson can be considered without reviving the bitter controversy concerning the honor of the discovery and introduction of anesthesia, in which he was one of four principal contenders, all Americans. It was established by competent witnesses that Crawford W. Long had administered sulphuric ether for minor surgical operations in 1842, two years before Morton, but Long did not then publish the method nor demonstrate it to the profession, so he does not deserve the credit of bestowing this great boon on mankind. Horace Wells, a dentist of Hartford, Connecticut, believing that the inhalation of nitrous oxide would make the extraction of teeth painless (Sir Humphrey Davy in 1800 had suggested that this gas "may probably be used with advantage in surgical operations"), at his own sugestion had one of his molars extracted, while a brother dentist, G. Q. Colton, administered the gas (1844). Wells then used nitrous oxide in his own practice. He attempted demonstrations in Boston and New York, but these were all failures, and in one case fatal. Unsuccessful and disappointed, Wells is said to have committed suicide. William T. G. Morton, a student of medicine and former partner in dentistry of Wells, knew of his efforts. From his preceptor, Charles T. Jackson, who was an able chemist, Morton received the suggestion that ether (chloric ether was first used, then sulphuric ether) would produce anesthesia, and Morton used it successfully in his dental work in 1844. Two years later, by invitation, he anesthetized a patient for an operation by Dr. John Collins Warren in the crowded amphitheater of the Massachusetts General Hospital. Whether or not Jackson suggested ether to Morton (and it is denied by some) Jackson does not appear to have administered it for narcosis nor to have experimented with it for such purpose. Whatever credit may belong to Jackson, it was Morton who first successfully demonstrated that surgery could be made painless and it was he who thus publicly introduced and proclaimed "painless surgery," perhaps the greatest of America's many great gifts to civilization. But Morton lacked the nobility of character which ought to be a consideration in selecting the candidates for the Hall of Fame. His conduct was far from ethical. He attempted to keep the nature of his narcotic fluid a secret; he disguised the ether with aromatic oils; he, jointly with Jackson, patented it under the name of "letheon," and he essayed to limit its employment to those who paid him for a license to use it.

No physician (except Oliver Wendell Holmes) has yet been admitted to a place in the Hall of Fame. The names to be first thus honored should be of those whose contributions to medicine and to mankind were epoch-making:—*Ephraim McDowell,* that brilliant surgeon and pupil of John Bell, who, in 1809, in the "backwoods" of Kentucky, performed the first deliberate ovariotomy and with twelve subsequent recorded cases established the operation in surgery; *William Beaumont,* the army surgeon who in 1833 published his "Experiments and Observations" on the gastric fistula of Alexis St. Martin—observations that provided our knowledge of the activities of the stomach, established the basis of dietetics and wrote a brilliant and romantic chapter in the annals of experimental physiology; *James Marion Sims* (1813-1883), the founder of gynecology.

After these, among American medical men who were "great" in character and influence as well as in accomplishment, there are several to be considered long before those in this curious group of nominees. We have mentioned some of them among the surgeons. Others are: *John Shaw Billings,* the eminent bibliographer who made the library of the Surgeon-General of the Army the greatest working medical library in the world, gave us the Index-Catalogue, and planned both the buildings and the organization of the Johns Hopkins Hospital; *S. Weir Mitchell,* neurologist-novelist-poet, whose studies of periperal nerve injuries were epochal and who made many other important contributions to our knowledge of organic and functional nervous diseases; *Benjamin Rush,* signer of the Declaration of Independence, who Garrison, in his "History of Medicine," says "was easily the ablest American clinician of his time," who described several new diseases, wrote the first American book on insanity, and made "perhaps the earliest American contributions to anthropology"; *Joseph Leidy,* the great American anatomist, biologist and naturalist, who made important discoveries in helminthology and parasitology.

There were many eminent American physicians less "great" than these, but, as benefactors to mankind, more worthy of consideration than most or all of those who have been "nominated" for the Hall of Fame. As examples we need but mention two: *Walter Reed,* who, with his collaborators, demonstrated the transmission of typhoid fever by the fly and yellow fever by the mosquito; and *Joseph O'Dwyer,* who perfected laryngeal intubation and saved the lives of many infants.

SOUTH AMERICAN SURGERY.

Of much interest to surgeons in the United States are the accounts, in recent issues of *Surgery, Gynecology and Obstetrics,* of the South American trip of Drs. William H. Mayo and Franklin H. Martin undertaken on behalf of the American College of Surgeons and with a view to extending fellowship in that college to the southern continent. These accounts relate an up-to-dateness in the surgery of the larger South American cities that is as gratifying as it is, we confess, surprising. We quote from Dr. Mayo:

> Their medical schools are splendid institutions with a seven-year course, and are the equal in equipment and methods of theoretic teaching of any in the world. In South America "Commencement Day" means just that, for after graduation the young surgeon begins a special course of surgical training. Instead of carving his way to knowledge and experience by the scalpel, he is tutored for a period of from eight to ten years along lines which we of the United States have accepted only recently under the general term of fellowships in graduate medicine and surgery.
>
> The hospitals of South America are imposing, built for the tropics, and associated with the medical schools. The hospital records are the best I have ever seen; this is true of every hospital we visited, small or large.

And from Dr. Martin:

> I am quite sure that Lima, Santiago, Valparaiso, Buenos Aires, or Montevideo could entertain a surgical society of the United States or Europe and give a surgical demonstration that would reveal a broad experience, approved facilities for diagnosis, recognized technical ability, and a fundamental knowledge of surgery that could not be excelled anywhere.

It would seem from these reports that the college would be honoring itself by including the best surgeons in South America, and that we should have them also in mind, as well as our Canadian colleagues, when we talk of "American" surgery.

A DECADE OF "SURGICAL SOCIOLOGY."

Ten years ago we established in the Journal a then unique department of Surgical Sociology under the editorship of Dr. Ira S. Wile of New York, who, though not a surgeon, was nationally known by his activities in, and contributions to, public medicine in many of its various phases. Each month since then Dr. Wile has contributed an editorial on some timely aspect of social medicine that concerned the public relations and obligations of surgery—preventive and corrective,—of surgeons as a class, and of hospital, institutional and industrial surgeons in particular." These interesting editorials have been much quoted, and, we believe, have contributed largely to the quickening of our profession's interest in the social aspects of surgery—and medicine.

When this pioneer department was established the social phases of medicine were receiving inadequate attention, especially so within the profession itself. The decade of its publication has witnessed, however, a remarkable growth of interest in the subject; the early efforts of the JOURNAL to introduce surgical sociology as a part of medical literature has been justified by the present frequency of articles on the social aspects of medicine and surgery in the medical journals and by the establishment of special journals devoted to public and industrial medicine; and many of the reforms suggested, sponsored or supported in the JOURNAL have found introduction into medical and surgical practice. Believing, therefore, that the educational purpose of the department of Surgical Sociology has now been fulfilled, Dr. Wile has decided to discontinue it. We accept his decision with regret, tempered by his promise of occasional contributions in the field in which he has written his name large. On behalf of our readers, and for ourselves, we thank him for a decade of loyal helpfulness and stimulating achievement.

Surgical Suggestions

A gumma of the cheek may much resemble a basal-celled carcinoma.

Sciatica associated with tenderness in the region of the sacro-iliac joint may be relieved by strapping the pelvis or applying a suitable corset support.

A transverse incision of the scrotum (in one of the folds) heals with better cosmetic result than a longitudinal incision.

Varicocele of rapid development suggests some obstruction to venous return (e. g., pressure by iliac glands), which should be investigated before operating.

Sometimes a chronic breast abscess is indistinguishable, by inspection and palpation, from a carcinoma.

A single emptying of a mammary cyst with a needle is often curative; but it is best to impress the patient with the importance of keeping under observation.

Confronted with an "acute abdomen" it is foolish and dangerous to sit by waiting for the leucocyte count to rise. If the signs and symptoms indicate operation, operate!

Joint suppuration treated by free incision and active movements (Willems) may recover with perfect function. Treated by drainage with gauze or tube, ankylosis—or worse—is inevitable.

Tonsillectomy and other operations in the throat should not be performed under general anesthesia without the use of a suction apparatus to prevent aspiration of blood or other matter into the lungs.

The outlook for a surgical operation upon a diabetic is far more serious when the condition operated upon is directly related to the diabetes (e. g., carbuncle, cellulitis), than when it is merely incidental.

Don't expect results from Carrel-Dakin treatment if the Dakin solution is not properly made and carefully titrated, if the tubes are not applied where they should be, if the dressings are not conducted *lege artis.*

In a case of long-standing jaundice blood transfusion before operation is probably the best means of preventing bleeding during or after the operation that would otherwise probably result from the cholemia.

It is important to bear in mind that after "run-over" and other abdominal injuries there is sometimes a deceptive "silent interval" of twelve to twenty-four hours before a tear of the small intestine manifests itself by symptoms.

In the aged the temptation may be great to drain an abscess through a small incision. This is a mistake. A younger individual, with greater powers of resistance, may heal thus; but in the senile it is important that the drainage be very free.

In determining the cause of an obscure peritonitis it is worth bearing in mind that a very high leucocytosis (50,000-60,000) speaks for a pneumococcus infection. A twisted viscus, e. g., ovarian cyst, may also cause a very high leucocytosis.

Progress in Surgery

Selections from Recent Literature.

Edward Bleier, M.D., Abstract Editor.

Syphilitic and Tuberculous Joints. Percy Willard Roberts, New York. *The Journal of Orthopedic Surgery*, May, 1920.

Roberts summarizes the essential features of the problem as follows:

"First, there was abundant confirmation of the opinions expressed many years ago by Gibney, Ridlon, Whitman, Sayre and others that cases of joint syphilis cannot be distinguished clinically from tuberculosis. My experience leads me to go further than this and to say that the symptomatology and radiographic findings of these two diseases is usually so nearly identical that to make a diagnosis of tuberculous joint disease without first eliminating the possible presence of syphilis invites serious error which jeopardizes the welfare of the patient.

"Second, the Wassermann test upon which so much reliance is placed in the diagnosis of acquired syphilis, is of comparatively little help in the late manifestations of inherited lues. In forty-seven cases where symptoms subsided under mixed treatment and where often there was a positive family history and other stigmata of lues, Wassermann tests made with an alcoholic antigen gave eleven weak positives and thirty-six negatives. The same bloods treated with cholesterinized antigens gave thirty-three positives from one- to four-plus and fourteen negatives.

"Third, the medical treatment of cases of this nature does not differ materially from that of acquired syphilis. The cardinal points are to crowd whatever drugs may be used to the limit of tolerance and to continue treatment for at least a year after all symptoms have subsided. There are two great dangers of relapse. One is the premature abandonment of vigorous therapy and the other severe trauma. The latter is always a menace, as children may feel perfectly well and be apparently normal long before their bone lesions are completely healed.

"Fourth, the orthopedic treatment of these cases varies somewhat from that usually employed in tuberculosis as the goal aimed at is quite different. In tuberculosis a firmly ankylosed joint is generally desirable as tissue regeneration is not to be expected. In syphilis, on the other hand, replacement of necrotic bone areas may occur with the restoration of practical function. Therefore weight-bearing joints should not be maintained indefinitely in plaster casts, and the patient should be allowed to walk. Removable braces which will prevent weight-bearing and allow motion in the joints when the patients are lying down are preferable. So, also, are removable splints for the upper extremities, in order that voluntary motion at prescribed intervals may be carried out after the acute symptoms have subsided. Spine cases should, of course, be continuously immobilized until the radiograph shows solidification of the diseased bone."

Anthrax: Comparison of Surgical and Nonsurgical Methods of Treatment—A Review of Fifty-one Cases Treated at the Massachusetts General Hospital from 1888 to 1918. Albert J. Scholl, Jr., Los Angeles, *Journal of the American Medical Association*, May 22, 1920.

Scholl reviews fifty-one cases treated at the Massachusetts General Hospital from 1888 to 1918. Anthrax bacilli were found in 81.2 per cent of the cases. The mortality in the cases reviewed was 13.7 per cent. Four of nine patients (44 per cent) treated surgically died; only three (7 per cent) treated nonsurgically died. Forty-two patients had lesions on the face and neck. Cervical infections are especially dangerous; two of the patients treated nonsurgically died from respiratory difficulty resulting from the associated edema. The patients treated nonsurgically were confined to bed; their lesions were left absolutely alone and exposed to the air; no special or general measures were carried out. In several of the surgical cases a rapid increase in the edema, a steady decline in the patient's general condition, and death several hours later definitely pointed to the operation as the causative factor. The average duration of the disease in patients that recovered was twenty-three days. Death in the seven fatal cases occurred on an average of four days after the onset of the disease. Thirty-eight infections were in men engaged in handling hides; of these twenty-three were leather tanners. All of the patients treated were males except one. This was a girl, aged 17, who was employed sorting bristles in a brush factory.

The majority of the methods of treating anthrax described in the literature are conservative. Surgical intervention offers very little. The organism is building up protective barriers and walling off and splinting the infected area. The main contention of those advising surgery is that the lesion is strictly a local one, and excision should be performed before generalization takes place. There is probably a systemic infection from the onset, but in most cases it is not so great that the organism cannot overcome it.

Anthrax serum was used in only one of the cases of this series. The temperature, which had remained at 103° for five days, dropped immediately after the first injection and remained normal. Sclavo, in Italy, and Marchou, in France, reported the use of anthrax serum. The serum had been used extensively in Italy and also recently in France, but only rarely in this country, although it is readily obtainable here. Legge studied a series of cases treated by Sclavo with serum. In 164 cases there was a mortality of only 6.09 per cent, in contrast to 24 per cent, the rate for all cases treated in Italy over a period of fifteen years. Pied cites nine cases with a positive blood culture, in seven of which serum treatment was used successfully. Bissel and Graham also report two cases with positive blood culture, successfully treated, serum having been used. Bowlby and Andrews report a case in which cultures from the vesicles around the lesion yielded abundant anthrax bacilli. Nineteen hours after an injection of serum, cultures similarly taken were negative. Serum, which is evidently not harmful to the patient, generally arrests the extension of the edema.

The Present Status of Neurological Surgery. Charles H. Frazier, Philadelphia. *The Journal-Lancet*, May, 1920.

Frazier outlines in a general way the problems of neurological surgery, and reviews some of the recent advances.

He refers to the operation for trigeminal neuralgia first. He thinks we may characterize *section of the sensory root* of the Gasserian ganglion as the radical operation for the relief of major or epileptiform neuralgia. Throughout a number of years operations ranging from peripheral nerve-sections to removal of the Gasserian ganglion by various difficult and dangerous routes had been experimented with. Cerebral complications, facial paralyses, and defects in vision were seemingly unavoidable complications of the radical procedure, and the mortality was appallingly high. Those, however, we may now characterize as ancient history, and forget the disfiguring scar, the intracranial complications, and the death toll. As now practiced, section of the sensory root of the Gasserian ganglion is eminently satisfactory. From the standpoint of cosmetics, the scar is invisible, and the symmetry of the face undisturbed. In recent operations Frazier found it quite feasible to conserve the motor root and thereby leave undisturbed the muscles of mastication. From the standpoint of safety the risk seems ridiculously slight when we consider that in most instances our patients are elderly people. In his last 130 consecutive operations, Frazier had but one death, and that was of apoplexy twelve days after the operation. We can dismiss from our minds now anything that relates to the technic of the operation. It may be looked upon as a finished product. The profession, as a whole, now may consider it in the light of a completed modern achievement.

The routine performance of decompression in traumatic cases is unjustified. The operation should not be practiced in cases that should be recognized as inevitably fatal nor in those cases in which recovery without intervention seems probable. The operation should be reserved for such cases as develop during the first forty-eight hours signs of increasing intracranial pressure, if this be of such a degree as to threaten the function of the medullary centers. In determining when this critical state is approached, certain fallacies, which have crept into literature, should be avoided. Some would have us believe that the increasing blood and intracranial pressure, together with edema of the optic discs, is an infallible operative sign. To follow this teaching would lead to many false conclusions. In order to derive any valuable assistance from circulatory changes, the surgeon should observe the pulse pressure rather than the systolic pressure, and as the pulse pressure approaches the pulse rate the time for intervention is at hand. But the decision for or against operation in this emergency should be based, not alone on the evidences of increasing pressure, as exhibited in the circulation or eyegrounds, but with a much wider perspective of the effect of pressure upon the cerebral function as seen in the disturbances of the reflexes—of the motor mechanism, of consciousness, and of the respiratory apparatus.

Frazier deals in general with the subject of brain tumors, and their classification. Of operations for pituitary tumors the transphenoidal is the method of choice. The article closes with a review of the subject of nerve repair, regeneration and suture.

Notes on Ureteral Stone. G. Kolischer, and J. S. Eisenstaedt, Chicago. *Journal of the Michigan State Medical Society,* May, 1920.

There has been a reaction recently from the too liberal employment of cutting operations for ureteral calculi. Even large stones with rough surfaces may be expelled by ureteral contractions. Stones impacted in the upper third of the ureter should be removed by pyelotomy, without stripping the ureter. Pyelotomy is a much safer procedure than ureterotomy. Stones impacted in the intravesical portion of the ureter should be removed either by the operating cystoscope or suprapubic cystotomy.

Liberating such a concretion through the cystoscope is accomplished by either dilating the ureteral ostium by means of an alligator forceps and injection of a lubricant, or widening the ureteral mouth by incising it by means of fine scissors or a slender galvano-cautery introduced through the conducting channel of the operating cystoscope.

If necessary, extraction is accomplished with a fine forceps inserted in the same way. The cystoscopic method may be tried in all cases in which part of the stone is already seen to protrude from the ureteral mouth or in those instances in which the concretion is not caught in the mucosa (on account of a cross position), and if there is no pronounced inflammatory reaction in the involved area.

But it is just those cases of immovable impaction of a stone associated with marked inflammatory reaction in which there arises the indication for prompt removal of the concretion.

Cystoscopic endovesical manipulations in such cases are not advisable for the following reasons. The mucosa around the ureteral opening is very hyperemic and vulnerable to a high degree. Any manipulation traumatizing it will immediately cause profuse hemorrhage. This obscures the cystoscopic view to such an extent that the necessary steps can no longer be carried out under the guidance of the eye.

Inflammatory reaction evidences itself by redness of the vesical mucosa over the area concerned, by the appearance of wrinkly folds which cover the intravesical part of the ureter, and in a pronounced protrusion into the bladder of this area. The region of the ureteral end assumes the appearance of an inflamed nipple or of a red raspberry.

In all cases of this kind it is preferable to open the bladder by suprapubic incision and expose the trigonum to direct approach. The ureteral opening is then incised to the extent desired and the concretion extracted with a fine forceps. It is unnecessary to suture the slit in the orifice after removal of the stone—healing proceeds favorably without it and in this way there is also eliminated the likelihood of the formation of phosphatic deposits.

In case considerable oozing should occur, it is checked by touching the bleeding edges with the galvano-cautery.

After the ureteral operation is completed, the bladder is sewed up without drainage and the fascia and skin closed over it.

Correct suturing of the bladder and reliable subfascial drainage will insure primary union so that the healing process is completed in from seven to nine days.

Surgery of the Kidney. E. S. Judd, Rochester, Minn. *Minnesota Medicine,* May, 1920.

Judd reviews the field of renal surgery, noting particularly the advances made in diagnosis and the important changes in surgical technic.

In reference to floating kidney, he says:

"The movable and the floating kidney have ceased to occupy an important place in surgery. At one time the surgeon considered it advisable to fix in the normal position all kidneys that seemed to lie too low or to be too movable, but at the present time, the mere position of these kidneys is not deemed an indication for operative treatment. Usually, this condition of general visceroptosis is associated with the syndrome of general neurasthenia and will not be benefited by surgery. Undoubtedly, at times the floating kidney assumes a position which causes a change in the position of the ureter, so that the flow of the urine is obstructed and an intermittent hydronephrosis, which can be determined by a special examination, results. In such cases surgical treatment is advised, although it does not always give the best results. Interference with function is the factor which should determine the advisability of operation."

In view of the fact that surgery is not always satisfactory in hydronephrosis cases, it seems best not to be too urgent in advising it. If an anomalous vessel is the cause, the condition will be relieved by the division of this vessel, provided the hydronephrotic sac is not too large. If the cause of the condition is a stricture or an angling of the ureter a plastic operation at this point of the ureter would seem to be indicated. A number of these plastic operations have been done in the clinic in cases in which hydronephrosis was sufficient to produce marked symptoms and yet had not resulted in any destruction of the kidney. The results in these cases have not been generally satisfactory. Some patients have had recurring trouble which required nepthrectomy. The operation described by Peck, "splinting the ureter," has proved very satisfactory in some cases.

Tuberculosis of the kidney requires nephrectomy. This may be performed even in the presence of a healed or inactive lesion in the lung.

The incision used at the Mayo Clinic for exposing the kidney combines the advantages of the so-called posterior and anterior incisions, adding materially to the facility with which these operations may be performed. It is crescentic, beginning well forward on the flank above the spine of the pubic bone, extending backward and upward to the point of articulation between the last rib and the vertebrae. The incision must extend far enough forward to give a good exposure of the pedicle in cases in which the pedicle is short and the kidney high-lying. The operation is extra-peritoneal throughout. The important sensory nerves come into view readily and are preserved. In some instances it is necessary to cut through the muscles. The perirenal fat should be extensively removed in all tuberculous and malignant cases. The cut-off end of the ureter should be isolated in all tuberculous cases, in such a manner that it will not soil the wound. This may be accomplished by fastening the ureter outside the wound or isolating it by threading it through a rubber tube. The pedicle consisting of the renal vessels should be caught by two clamps. When tying the pedicle, the deeper of the two clamps is released while the ligature is being tightened onto the pedicle; in this way the pedicle is controlled by the ligature and also by the second clamp. Another ligature is then placed on the pedicle before the second clamp is removed.

Acute Intussusception. Report of a Case Relieved by Enema. Samuel K. Levy, Brooklyn, *Medical Record,* May 15, 1920.

Levy reports a case in order to suggest the utility of giving less radical measures at least a hasty trial before resorting to operation, especially in cases seen early. The case reported was a classical one, with the usual signs of low intestinal obstruction, and the mass palpable through the abdomen and the rectum. The child made a complete recovery. The height of the enema container should be four to six feet.

Not all pediatricians and surgeons are in favor of immediate operation, and there are those who advise the use of manual and aerohydrostatic methods, even in long-standing cases. Notable in this group are several Danish clinicians. Porter advocates this method, yet sees "no good reason why the abdomen should not be opened and a similar procedure be undertaken in full view of the surgeon." Hess says: "It is before decided pathological changes in the intestine will have taken place that we may hope to obtain results by irrigation, or other mechanical methods of reduction." Griffith advises the use of non-surgical methods of reduction in cases that have lasted one or two days. McMurtry cites a case of non-operative reduction after three days duration. Apfel mentions Kerley's case of reduction of an intussusception, which had existed six days, by means of water pressure. Dawe reports a case of acute intussusception reduced by manual manipulation over the abdomen, together with enema.

Review of Some of the Present Uses of Radium in Medicine. Howard A. Kelly, Baltimore. *The Journal of the Medical Society of New Jersey,* May, 1920.

The most remarkable results are obtained in lymphosarcoma. All cases should be treated with radium, never operated upon. Hodgkin's disease is also curable when taken early. A certain number of cases of leukemia have been reported cured and well after a number of years. The successful results are directly proportionate to the early recognition of the disease and its prompt treatment with radium. Epitheliomata of the hands and face, when not too far advanced, are relieved in 95 to 98 per cent. of the cases. In cancer of the lip, radium will often wipe out the local lesion, but the enlarged glands of the neck should be taken care of surgically. Where the extent of the disease is uncertain as in cancer of the breast, surgery is preferred, because of the impracticability of radiating a large area, but radium is prefered for local recurrences. In fibroid tumors of the uterus, radium is the preferable treatment. In older women menstruation is stopped in this way, the tumors cease growing, shrink or disappear entirely. In cancer of the cervix, radium is the treatment *par excellence,* and is always preferable to surgery. In the cases in which the disease has invaded one or both broad ligaments, and in the massive cases, there is no other rational treatment. In recurrences after operation, it is also of service. Cancer of the body of the uterus is best treated surgically. Primary cancer of the vagina melts rapidly under radium.

Partial Splenectomy. Nelson Mortimer Percy, Chicago. *Northwest Medicine,* April, 1920.

After a preliminary discussion as to the rationale of partial splenectomy, Percy presents the technique as experimentally applied and the results that follow.

The primary purpose was to determine whether or not it was a surgically feasible procedure. Is the hemorrhagic feature controllable and suture practicable? Secondarily, to observe the blood pictures. Dr. Nickson, assistant professor of pathology at the University of Washington, made the blood counts at forty-eight hour intervals. It was expected to find the usual picture, as described by Pearce, Krumbhaar, and Frazier in their experimental work in total splenectomy; namely a so-called secondary anemia, characterized by its prompt onset, gradually increasing anemia and a slow return to normal in from two and a half to three months.

In the first instance there was a most unexpected blood picture—an increase over the normal which climbed gradually from 5,000,000 up to 5,600,000. A like picture was again presented in the next and succeeding animals operated upon. An increased count amounting in one case to almost 1,000,000, a distinct polycythemia. Possibly this is a reversion back to the fetal blood-making function, because of traumatic irritative changes or reduction of a hemolytic sensitizing substance which the spleen may supply to the blood-destroying qualities ascribed to the liver.

Percy concludes:

1. That partial splenectomy is a comparatively simple operation in the dog, that the matter of hemorrhage is readily controllable and healing occurs by primary intention.
2. That a partial splenectomy in his five cases was accompanied by a distinct polycythemia.

It remains to be demonstrated:

1. Whether this condition will be constant and whether it will be so manifested in the human being.
2. And also what value an increase in red cells thus produced by partial splenectomy will have upon the course in the treatment of hemolytie jaundices, Banti's disease and pernicious anemia.

The Wassermann Reaction and Miscarriages. Herman Goodman, New York. *Surgery, Gynecology and Obstetrics,* April, 1920.

Goodman reports the results of the Wassermann reaction in blood taken from 1,320 pregnant women at the Sloane Maternity Hospital, New York City. Of this number, 89, or 6.7 per cent, gave four-plus positive results, two per cent more gave three-plus positive, and the frank negative tests were given by only 87 per cent of the women.

That syphilis as evidenced by the serological reaction is a fruitful source for frustrated pregnancies, and comparative sterility is shown by the tables in the report. Of the four-plus positive multiparas, 52 per cent had suffered one or more miscarriages, as compared to 37 per cent of the Wassermann-negative multiparas. No four-plus positive patient gave a history of having been pregnant more than six times. Tables illustrative of another phase of the problem are interesting. Among the syphilitic women carrying their second child, 38 per cent had miscarried the first as compared to 27 per cent of the 2-gravida Wassermann-negative women who had miscarried the first pregnancy. The expectancy for the four-plus Wassermann multipara to miscarry is 75 per cent, while that of the negative multipara is about 45 per cent.

Goodman further reports that only one woman among the 1,320 gave a history of having had syphilis, although approximately one woman out of every eleven gave a strongly positive Wassermann reaction.

A Case of Maceration in the Living Newborn. (*Ein Fall von Maceration des lebenden Kindes.*) Harold Lorenzen, Jena. *Zentralblatt für Gynäkologie,* January 31, 1920.

The child was born after short labor, the mother being 26 years old, primpara, Wassermann reaction negative. Child weighed 6½ pounds, 53 cm. long, presenting the appearance of complete maceration. The epidermis hung in long strips from back, hands and feet. On face, chest and extremities the skin was loosened in smaller tags. Fingers and toes were enclosed in real epithelial tubes. No bullae, and no extension to mucous membranes. On close inspection a fine layer of new epidermis, which allowed the red, vascular corium to shine through, everywhere existed, so that no raw spots were found. By the seventh day the child's skin, though red and tender, was fully regenerated.

Dead macerated fetuses are common. The liquor amnii, especially if it contains meconium (bile-salts) rapidly macerates dead fetuses causing the epidermis to scale off and then penetrating deeper and attacking the soft parts. Syphlitic pemphigus and congenital simple pemphigus can be excluded. They manifest themselves first by formation of blebs, which were entirely absent in this case, and are usually fatal.

A Case of Intractable Urinary Incontinence Cured by the "Goebell-Stoeckel" Operation. (*Ein Fall Hartnäckiger Incontinentia urinae und deren Heilung mittels der Operation "Goebell-Stoeckel."*) A. H. M. J. van Rooy, Haarlem. *Zentralblatt für Gynäkologie,* February 21, 1920.

The patient, now 36 years old, has suffered from complete urinary incontinence since her 20th year in consequence of forcible extraction of a vesical stone per urethram. Three previous operations (two attempts to unite the sphincter internus, and one Gersung twisting) had failed.

The operation consisted in a transverse incision, immediately above the symphysis pubis, down to the fascia. Four cm. to the right and left of the median line parallel longitudinal incisions are made in the fascia; 7 cm. above the symphysis these incisions are united by a cross cut. This gives a musculo-fascial flap, the pyramidales muscles being attached to the deep surface of the fascia, with base at the symphysis. The recti muscles are now separated, and mainly by blunt dissection the neck of the bladder is freed (of course extraperitoneally) from the pelvic walls. Venous hemorrhage to each side of the bladder neck is controlled by packing. The flap is now split in a median longitudinal direction so as to give two independent flaps. The free tip of each flap is secured by a guide suture which is attached to the corresponding packing at the side of the bladder neck. The abdominal wound is closed by approximating the recti (the flaps being buried) and closing the skin.

Through a median anterior colporrhaphy incision the posterior urethra and bladder neck are mobilized, scar tissue being excised. The sphincteric musculature is repaired as well as possible. By incising a thin fascia the buried packings were reached and withdrawn, bringing down the muscle-fascia flaps with them. The flaps were united, by their muscle tissue so as to completely encircle the base of the bladder and strengthen the sphincter region. Complete closure of vaginal wound. Catheter left in situ for 14 days. The patient has been and is continent for one year.

Book Reviews

Injuries to the Head and Neck. By H. Lawson Whale, M.D., Camb., F.R.C.S., Eng. Capt. R. A. M. C. (T. F.), formerly Capt. I. M. S. (Retired); The Queen's Hospital, Sidcup; No. 83 General Hospital; and Surgical Specialist to No. 53 General Hospital, B. E. F.; Surgeon for the Ear, Throat and Nose to the London Temperance Hospital; and to the Hampstead General Hospital. With Preface by Colonel Frederick F. Burghard, C.B., M.D., M.S., F.R.C.S. Small octavo; 316 pages; 130 illustrations. New York: Paul B. Hoeber, 1919.

There appeared during and after the war innumerable articles and monographs dealing with the management, immediate and remote, of gunshot injuries of the head, face, neck—all of them of more or less interest and some of them of much importance. We would put this book in the latter class. Although not a large treatise it contains a wealth of valuable information gleaned from the personal service of a British surgeon throughout the war in this one field of work—beginning with cases from the first battle of Ypres, later in the department of oral surgery in the largest base hospital in Boulogne and finally in the now famous hospital for maxillo-facial surgery at Sidcup, England.

As the author states in his introduction, this is not a text-book nor does it deal with tabulated series of cases or other statistics. It represents rather a selection of illustrative cases and systematized observations from the author's own experience. With such practical information it is replete and one can not read any of the pages at random without learning something worth while.

Injuries to the brain and to the eye are not discussed, except quite incidentally. The subjects dealt with are: hemorrhage, extraction of foreign bodies, infection, the larynx, the ear, the nose and accessory sinuses, the lachrymal sac, rhinoplasty, the early and the late treatment of gun-shot wounds of the face, and the jaws. These subjects are freely illustrated with photographs of cases, showing, for the most part, excellent results in conditions that might appear, at first, far too extensive to offer any prospect of satisfactory repair. The author, however, has not attempted to display merely good-looking facial restorations but rather to indicate the essential considerations in plastic repair of the nose, mouth, ear.

The work of the "maxillo-facial" surgeons in the war will last beyond the lives of those who were benefited by their skill. It will carry over in some measure, at least, into the purely cosmetic surgery of civil life and especially into the management of severe injuries.

While this work is altogether personal, i. e., based on the observations of the author himself, it is very modest and equally interesting and practical. It is well worth reading.

Plastic Surgery. Its Principles and Practice. By John Staige Davis, Ph.B., M.D., F.A.C.S., Instructor in Clinical Surgery, Johns Hopkins University; Visiting Surgeon and Plastic Surgeon to the Union Protestant Infirmary, the Hospital for the Women of Maryland, and the Children's Hospital School, Baltimore, Md.; etc. Large octavo; 770 pages; 864 illustrations. Philadelphia: P. Blakiston's Son & Co., 1919.

For several years Dr. Davis has devoted himself to plastic surgery, and periodic literature has contained many contributions from him. Success in this field can not come without concentration of effort and the general surgeon whose reconstructive work is only occasional is not apt to secure the best results.

In this book the author has planned to survey the whole field of plastic surgery (other than military), of all parts of the body, including congenital abnormalities such as hairlip, hypospadias, syndactylism. It contains some original matter based on the author's methods, but most of it is familiar through text-books and articles that have preceded it.

In bringing a large variety of lesions within the scope of his treatise the author has not escaped some inconsistencies. He treats of hammer-toe but not hallux valgus or club-foot, of atresia vaginae but not atresia ani. He says, "We are interested here only in complete atresia of the vagina. The problem presented by cases in which the lower end of the outlet only is implicated are distinctly gynecological." Why complete atresia is less "distinctly gynecological" we are at a loss to understand, the more so since his brief description of the various methods employed to manufacture a vagina adds nothing new to the subject.

He describes the classic plastic external operations on the nose but does not deal with cosmetic operations by the intranasal route. In discussing cartilage implantation for raising the bridge he says, indeed, "I prefer not to take the greatly increased chance of infection which the internal incision gives."

There are good chapters on plastics of the lips, the eye lids, the face, the ear and the extremities. The arrangement of subjects, however, is neither convenient nor logical. Macrocheilia is not discussed in the "surgery of the lips" but, with macroglossia, in a miscellaneous chapter on "malformations" including nevi, polydactylism and hammer-toe.

Hare-lip and cleft palate, hypospadias, epispadias, extrophy of the bladder and atresia of the vagina, which are certainly "malformations" are dealt with in separate chapters. Congenital malformations of the ear, however, are *not* separated from the chapter on "surgery of the ear" (which, incidentally, should have been titled "surgery of the auricle").

The chapter on skin transplantation, a subject to which Davis has given much attention—is very interesting. While, of course, he prefers autografts where possible, he has also had some successes with isografts (probably in cases where there was blood group similarity between host and donor) and also with animal grafts. He has not had success with fetal membrane grafts. The technic of applying Reverdin grafts (or, as Davis calls them, "small deep grafts") is well described. He always applies a dressing (ointment or silverfoil covered by rubber protective) directly to the grafts, and does not approve of leaving them exposed to the open air until after a few days have elapsed.

The book is attractive in appearance and well illustrated. A bibliography is appended to each chapter.

Handbook of Diseases of the Rectum. By Louis J. Hirschman, M.D., F.A.C.S., Vice-Chairman, Section on Gastro-Enterology and Proctology, A.M.A.; Ex-President, American Proctological Society; Professor of Proctology, Detroit College of Medicine; Proctologist, Harper Hospital; Major, M.C., U.S.A. (Honorably Discharged), Detroit, U.S.A. *Third Edition.* Octavo; 360 pages; 223 illustrations and 4 colored plates. St. Louis: C. V. Mosby Company, 1920.

This excellent manual has been before the profession for ten years and is too well known to require extended description. This third edition, delayed by the author's military service overseas, shows careful revision and, in some parts of the text, elaboration without, however, increasing the size of the book. Pictorially the work has been much improved as compared with the first edition. Descriptions of disease processes, diagnostic examinations, and technics of treatment are clear and scientific, and free from bias and unwarranted enthusiasm. Local anesthesia is emphasized and described for each operation. Cancer of the rectum is dealt with from the diagnostic side; its operative treatment is not included within the scope of the manual. As before, there is an admirable chapter on the *dysenteries*, by Dr. John L. Jelks, of Memphis.

Modern Surgery, General and Operative. By John Chalmers Da Costa, M.D., LL.D., F.A.C.S., Samuel D. Gross Professor of Surgery, Jefferson Medical College, Philadelphia etc. *Eighth Edition.* Large octavo; 1,697 pages; 1,117 illustrations, some in colors. Philadelphia and London: W. B. Saunders Co., 1919.

In reviews of previous editions of Da Costa's "Modern Surgery" we have taken pleasure in referring to it as the best single-volume treatise on general surgery in English. We would still so regard it, but in this edition we confess to a measure of disappointment. Although extensively revised and considerably rewritten and, withal, incorporating a great deal of new and important material, the work is not wholly up-to-date. In several sections Da Costa refers to contributions that have been superseded, and he describes some methods that are now discarded. We might refer to these in detail, but the author's frank and charming preface (itself written while on a naval transport) quite disarms criticism. The preparation of this edition was perforce undertaken "under extreme difficulties," while he was in active war service in the navy, deprived of the assistance of his usual collaborators in this preparation, who were similarly engaged. Parts of the book "were written in odd times and in strange places. The war was raging . . .," its saddening elements settling upon the author "as a vast obsession, full of sorrow and of heart-break, paralyzing thought of other things. It was a dreadfully hard task under such circumstances to sit at a desk and try to revise a book. It was an utterly impossible thing to do it as it should be done."

That many important articles were not accessible to the author during its preparation largely explains the deficiencies in this edition. The depression that obsessed him equally explains certain oversights in revision. As an instance of these, Da Costa discusses under "chronic abscess of bone," only the cortical abscess described by Brodie; he makes no mention of chronic *medullary* bone abscess; and he says "if the abscess opens into a joint, trephine the bone, and also open, irrigate and drain the joint." We cannot believe that, in the face of the lessons of surgery in the war, Da Costa himself would "drain" such a joint!

If this eighth edition is not up to the standard of its predecessors it is nevertheless still an admirable book, replete with information. After all, one does not expect to find in any text-book or treatise on surgery all that is to be said on any single subject and, as a reference, Da Costa's work is much more comprehensive than most of them. It has earned its place in the library of the practicing surgeon and is the best book on the subject, that we know, for the medical student.

Standard Nomenclature of Diseases and Pathological Conditions, Injuries and Poisonings, for the United States. Octavo: 347 pages. Washington: Bureau of Census, 1920.

The preparation of this standard nomenclature was begun during the war by the Council of National Defence, and it has been completed by the Bureau of the Census of The Department of Commerce. It is presented as "a first edition, intended to draw from physicians and all others interested free criticisms which will help to make a later edition of greater value."

Books Received

The After-Treatment of Surgical Patients. By Willard Bartlett, A.M., M.D., F.A.C.S., and Collaborators. In two octavo volumes; 1040 pages; 221 illustrations and one color plate. St. Louis: C. V. Mosby Company. 1920.

Les Blessures du Foie et Des Voies Biliaires. By P. Soubeyran, Professeur agrege à la Faculté de Medicine de Montpellier. Octavo, 209 pages; 73 illustrations. Paris: Felix Alcan, 1919.

The Future of Medicine. By Sir James MacKenzie, F.R.S., M.D., F.R.C.P., LL.D. (Ab. & Ed.), F.R.C.P.L. (Hon.), Consulting Physician to the London Hospital. Duodecimo; 238 pages. London: Henry Frowde, Hodder & Stoughton. Oxford University Press, 1919.

Common Diseases of the Skin. With Notes on Diagnosis and Treatment. By G. Gordon Campbell, B.Sc., M.D., C.M., Lecturer on Dermatology and Pediatrics, McGill University; Physician to the Montreal General Hospital. Octavo, 229 pages; illustrated. New York: The Macmillan Company. 1920.

The American Atlas of Stereoroentgenology. Edited and published under the sole auspices of the New York Roentgen Society. Vol. IX.| Troy, N. Y.: The Southworth Co., 1920.

The Case History Series: Diseases of Women, including Abnormalties of Pregnancy, Labor and Puerperium. A Clinical Study of Pathological Conditions Characteristic of the Five Periods of Woman's Life. Presented in One Hundred and Seventy-three Case Histories. By Charles M. Green, A.B., M.D., Professor of Obstetrics and Gynecology, Emeritus, in Harvard University; Senior Surgeon for Diseases of Women, Boston City Hospital; Formerly Visiting Physician, Boston Lying-In Hospital; Fellow of the American College of Surgeons; Fellow of the American Gynecological Society. Octavo; 466 pages; illustrated. Boston: W. M. Leonard, 1920.

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AFTER-CARE IN SUPRAPUBIC PROSTATECTOMY. SOME NEW FEATURES.

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Surgeons have always been divided in their opinion as to the best route to be selected for the removal of the enlarged prostate gland. Leading men on both sides have equally good results. Much depends upon the experience of the operator; a good deal upon the individual case. Those accustomed to operate through the bladder find it difficult to use the perineal method. As many more select the perineal route, feeling safer, better fortified. The welfare of the individual must never be forgotten. What seems best for the surgeon, may, in the end, prove expensive to the patient. Advantage gained by a simplified operative course, is often lost in disappointments attending post-operative care.

A few general points may be mentioned in favor of the suprapubic method. (1) The entire field is open to inspection, and within easy reach. Reflected light may be used. Rectal pressure elevates the prostatic region. In case of marked sepsis, it is the first step in a two-stage operation. (2) Complications, as hemorrhage, stone, and prostatic bar, are more easily managed. (3) The gland is just as accessible, and perhaps more so. Enucleation is very simple. The rectum may be as safely protected. (4) No more damage need be done to the prostatic urethra, if due care is exercised. (5) Drainage both ways is readily applied. (6) Retrograde catheterization may be used, when it is impossible to reach the bladder by the ordinary way. (7) A catheter may be fixed in position, to remain for the entire period of drainage. (8) During the process of recovery, the wound is well placed for subsequent treatment; away from the rectum, adding much to the comfort of the patient. (9) Except in carcinoma, a fistula following this method is almost unknown. Should it occur, obliteration is always possible. (10) The mortality should not be increased.

In support of the perineal route are, less shock, a shorter operation, and added safety against ascending infection; but the position of the wound and the disagreeable contamination until healing is complete, should not be overlooked. A fistula is fairly common, and its closure is well nigh impossible. If the fistula is vesico-recto-perineal, the embarrassment arising therefrom is indescribable.

My object is not to underrate the value of either of these methods. These comparisons have been made rather to bring out more fully the special features recommended in post-operative treatment.

After trying out the perineal and suprapubic methods pretty carefully, we found, from the standpoints of mortality, prompt recovery, final results and general satisfaction on the part of the patient, that the latter course is much to be preferred.

We had the usual difficulty with drainage, however, having used every known means advised to keep the catheter in place for the desired length of time. When the bladder is opened, as in cystotomy, the injury sustained, even though the wound is immediately closed, greatly reduces the normal expulsive power of the organ. This makes drainage by gravity all the more essential. For a similar reason, the largest size catheter should always be used.

In most cases we are likely to remove the urethral drain entirely too soon. It has, besides that of drainage, a special purpose, commonly overlooked, that of molding a new canal through the traumatized prostatic portion. Loss of sphincter control does not follow continuous catheterization. It is the unfortunate result of gland enucleation. Often a catheter cannot be easily reintroduced after prostatectomy. Then, too, insertion of the catheter frequently, either for drainage or irrigation, tends to prolong an existing cystitis.

The better the drainage through the urethra, the more quickly will the suprapubic wound close, giving the patient the power early to retain and expel the urine—just the things he could not do before the operation. Self-retaining catheters are apt to be ineffective. Likewise, when the catheter is held in place by adhesive plaster, or fixed to the foreskin by stitch or safety pin, it will either coil up in the bladder, or slip out too far, owing to variation in length of the urethra at different times. In either case, the effect is unsatisfactory. Asepsis and local cleanliness, also, are difficult to maintain.

Another very important matter leading up to better results in prostatic surgery, is the proper exploration of the entire urethra, either before or after preliminary cystotomy. Gentleness and much care must be exercised. In some cases, though there is not complete retention, a catheter, either metal or rubber, cannot be safely passed. This may be true, notwithstanding the bladder has been given physiologic rest by suprapubic puncture. Such a condition, if unrelieved, prolongs convalescense. A small meatus should be enlarged, and a stricture divided or divulsed to admit, easily, a 32 F. sound. This opens the way for the largest size rubber catheter. Such preparatory work requires very little time, and adds nothing in the way of shock. A large catheter, retained sufficiently long, will do much to prevent undesirable narrowing of the urethra later by contracture of the prostatic bed. The canal, having once been explored and, if need be, enlarged, is very likely to remain patent; but the use of the sound occasionally, after the patient is about may be required.

After the gland is removed, with calculi if any, and all hemorrhage controlled, a large rubber catheter is carried into the bladder, if not there already, and its tip delivered through the suprapubic wound. A strong piece of linen thread doubled, is sewed through the eye of the catheter, firmly tied, and all superfluous thread cut away. The needle is then brought out through the entire thickness of the abdominal wall—a little above the skin incision, if it is transverse; a little to one side, if vertical—and fixed over a piece of tape or rubber tube, so that about one inch of the catheter will lie free in the bladder cavity. A catheter anchored in this way will retain its position indefinitely. When the time comes for its removal, the thread is pulled out a half inch, iodinized and cut off, after which the catheter is withdrawn in the usual manner, dragging the thread after it. The linen thread passes through one side of the catheter only, and not through and through. Otherwise, precipitation of urinary salts would more easily block the passage. Administration of aromatic sulphuric acid will keep the earthy phosphates in solution.

The fixation thread and the suprapubic drainage tube leave the bladder side by side, but after that they are independent of each other. The tube should be of firm material, not too large, and have thick walls. The bladder is closed tightly around the tube by a purse string suture, as in cholecystostomy. A union of this kind, as stated by Warbasse, is virtually water tight for one week, at least. The space of Retzius is cleansed and oiled. A small drain is introduced for three or four days, to care for any extravasation. The wound is then neatly closed.

After irrigating the bladder freely with hot saline or boric acid solution, as a test of the drainage system, and to make sure that all excess blood has been removed, the wound is dressed, and the patient put to bed. Shock, if present, is given immediate attention.

Having made the required preparation for the patient's comfort, the "drip apparatus" is installed for continuous drainage. The fluid enters the suprapubic tube, under the usual amount of pressure, and escapes through the catheter, into a vessel by the bedside, where it can be observed by the nurse as to color and quantity. If the individual is not too fragile, we use the ice-cold boric acid solution. The cold water is soothing to the patient, and seems to check post-operative oozing better than heat. Hexamethylenamine is given as soon as the stomach will tolerate liquids.

In addition to the continuous drip, the bladder is flushed at frequent intervals. The nurse goes to the patient every half to three hours, during the first day or two, according to the amount of hemorrhage, and releases the stop cock enough to change the stillicidium into a stream. until the return flow is clear. This effectually cleanses the operative field, and frees the bladder of accumulated blood and urine. When the flushing is complete—and it should be done with some care, so as not to bring undue tension upon the suture line—the drip is once more established.

If the operator has been fortunate enough to permanently arrest all hemorrhage, there will be very little trouble from the irrigating process. He may have been unable, by any means, to control every bleeding point, or the patient's condition may have called for haste in closing the wound. In either case, hemorrhage may occur, early or late, and completely fill the bladder, causing pain and much anxiety.

The continuous drip will dilute and carry away an ordinary amount of blood. Frequent flushing will take care of still more. However, if clots should form, they must be removed. A very ingenious method is to draw them out by suction through the catheter or the suprapubic tube, by means of a large syringe, used for stomach work. Or, it may be necessary, in rare instances, to flush the bladder from one tube to the other, working patiently and persistently, until the passage is again clear. Obstruction from clots will very seldom occur if continuous drainage is used, since the fluid is in constant motion. It is a good thing, also to change from one solution to another, during the period of drainage, going from soda to saline, then back again to the boric acid solution, and so on. These varied solutions help to prevent incrustation of urinary salts about the catheter. The patient is given all the water he can retain, from the very start.

There being no adhesive plaster used to hold the catheter in place, it is much easier to maintain local cleanliness. Still, it is well to cleanse the catheter often with soap and water, and with weak bichloride of mercury solution, going back some distance from the meatus. Later, when there is no further hemorrhage, and the drip has been discontinued, mucus will begin to clog the catheter. It is then that soda solution, used as a daily irrigation, will be found very helpful in keeping the drainage system active. And still later, the upper tube having been removed, and the wound nearly closed, a cut-off may be applied to the catheter, to be released by the patient himself every half hour for urination. This period of retention is gradually lengthened, as the incision gains strength. The patient has a back rest early, and leaves his bed in two to five days. The suprapubic tube is removed in about two to four days, depending upon the patient's condition; but the catheter should be retained much longer, until the bladder function is well restored. This may require from one to three weeks. The upper drainage opening, during this time, is strapped together for the purpose of more rapid closure. The patient should be advised to void his urine frequently, for some time after leaving the hospital, to prevent reopening of the incision.

The method herein described has given us most excellent results in every particular, and, if properly carried out, will do away with much of the undesirable bed-wetting so common in prostatic surgery.

There is no doubt that we dismiss our prostatic cases too early. The short time in bed gives the patient a false impression of strength, and his next move is to go home. After leaving the hospital, a smooth, unbroken recovery is often fraught with many discouragements. He needs routine care, proper nursing, and helpful advice as to all the habits of life. Hexamethylenamine, laxatives and other medicines have their place, until the desired physical condition is reached. Most of all, the bladder must be kept clean if there is a remaining cystitis. Nothing is so refreshing to the patient, both locally and generally, as irrigation of the bladder, during convalescence from suprapubic prostatectomy, once or twice daily for a while, then less frequently. Of course, it is unpleasant work and takes time, but it counts in the end. Many patients, without solicitation, speak of the good effects to be derived therefrom. Some cases, it is true, cannot be greatly helped by any means, but the majority of them will show positive signs of improvement, if the post-operative treatment is faithfully carried out especially the smaller details, so often overlooked.

CHRONIC COMPLICATIONS FOLLOWING GONORRHEA, THEIR RECOGNITION AND MANAGEMENT.*

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That a very large proportion of the male population is suffering from the chronic complications following gonorrheas dating back one to fifteen years or more, there can be small doubt by anyone coming in contact with large numbers of men. How great really is this proportion, one wonders, but the answer is not so difficult as it might at first seem. A guess that 50% of all men have at one time or another had a specific urethral infection is probably not far from the mark. It is the only guess one needs make, for the other figures are a matter of recorded experience. By common consent urologists are fairly agreed that 75 or 80% of acute infections experience some form of complication. Of this minimal 75% one has cause with good reason to consider that half become chronic. That is to say—and we believe the estimate to be too low—that eighteen and three quarters per cent., or approximatly one-fifth of all adult males are suffering the prolonged after-results of ancient gonorrhea, with symptoms ranging all the way from slight discomfort to actual distress.

Many of these patients do not suffer in silence, and while only a small proportion develop pathological changes requiring urgent intervention in their behalf, they almost without exception make burdensome the life of some medical man, frequently a personal friend and family attendant. The harrassed physician, either through lack of interest, or impatience with this class of sufferer, and entertaining an honest belief that the complaint is no more than imaginary, finds these cases a problem with which he would only be too happy to have some other man struggle.

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* Read before the Alameda County Medical Society, February 21, 1920.

One-fifth of the male population is a large number, and though their ailments may not be to the average medical man's mind severe, or even worthy of sympathy, these patients will not, and cannot be dismissed with the mere assurance that there is nothing the matter with them. Smears and urinary examinations may not show gonococci, nor should much reliance be placed upon this, for in these chronic cases bacteriological examinations are of little worth, whether for diagnostic or for prognostic purposes, since, even when organisms may be demonstrated they are almost certain to be atypical. Nor does the absence of organisms mean anything at all. When an individual experiences urethral distress of any sort, such as itching or burning, when he has a "morning drop," moisture of the urethra, or when he has uncomfortable rectal sensations, one may be assured that there is a definite disease back of it.

Before one may undertake the alleviation of a urethral condition it is necessary that a diagnosis be made. Older classifications which went back no further than merely chronic anterior and chronic posterior urethritis will not serve. If results are to be obtained the actual condition must be proved, and generally this requires that the precise condition must be seen—not merely surmised.

Without going exhaustively into the subject we have to consider the following: (*a*) diseases anterior to the external sphincter; (*b*) diseases posterior to the external sphincter.

Reviewing briefly the anatomy of the urethra we observe that its form is that of a distorted letter S laid on its side. One end of the letter ends in the bladder at the internal sphincter, and the other ends at the urethral meatus. The posterior portion of this S-shaped urethra, or the first curve of the S, is the prostatic portion, divided at the very end of its head by the membranous portion which is surrounded by the external sphincter, beyond which is the anterior urethra. The urethral tube anterior to the external sphincter, in addition to its delicate membranous lining, contains the crypts of Morgagni and the glands of Littré.

Littré's glands, although present throughout the whole canal, are mainly confined to the anterior urethra. They are punctuate openings so small as to be difficult of observation in their normal state and they stud the canal in little groups. They are true glands and are 5 mm. in depth. The crypts of Morgagni are triangular shaped openings of much larger size, approximately one to one-and-a-half millimeters, and are situated on the anterior urethral roof. These minute structures are both of considerable importance, since they frequently become the site of retention infections.

Of the common chronic conditions affecting the anterior urethra there are:

Stricture, soft infiltration; granulation; folliculitis.

Stricture, without question the most important and the most spectacular of all urethral affections, we shall, for the reason that it has been so exhaustively written about, consider with less detail than other conditions. The difficulties of diagnosing stricture are not great for the lesion is gross; any instrument larger than the obstruction meets with resistance. But, whereas the diagnostic difficulties may be slight, the treatment is far from being so simple as is commonly assumed. Prognosis as to time of recovery must be guarded. One who rashly assures discharge from treatment at any specified time, is certain when the promised date arrives, to be reminded that the time for discharge has come, and from then on a discouraged doctor has to deal with a discontented patient. Such patients are embarassing and too frequently, with a feeling of animosity, they dismiss themselves. The most frequent mistake made in the treatment of strictures is the attendant's desire to do too much in too short a time. Strictures, when possible, require gradual dilatation—*very* gradual, one feels like insisting. For this purpose a very full armamentarium is required: metal sounds and catheters with guides to screw to the tip, and a complete assortment of bougies. Very great is the temptation to use a little force, when the instrument refuses to advance, hence the resulting false massage and endless troubles. It can be laid down as a principal that an unguided metallic instrument of size under 20 French should never be introduced by one who is not passing urethral instruments daily.

Soft Infiltration, the precurser of stricture, may manifest itself in no more serious symptoms than a persistent discharge; sometimes purulent, at other times merely watery. These soft infiltrations frequently persist for years, before they really become structure areas, and despite irrigations and soundings over long periods, to the great mental anguish of the patient, they refuse to get well. Their cure is to be accomplished only by a recognition of the actual condition which generally must be determined by observation. The passage of a sound or of an olivary bougie gives no satisfactory information, for no matter how delicate the touch it cannot detect the urethral changes present in soft infiltration.

These conditions must be viewed through the endoscope, when, to the practised eye, they are readily recognizable. What one observes is that the normally multiple striae are absent, and in their place are only two, or possibly three, striae with flabby membranous interlining.

A word here seems not inopportune regarding the endoscopic pictures. It seems so simple, this merely looking through a straight illuminated tube, that it would appear as if any intelligent person peering at the picture at the further end could decide upon the significance of what was directly under the eye. But it is very far from a matter of mere intelligence, it is more a matter of experience and constant application. One can safely say of everyone who has become even moderately proficient in the manipulation of the dry endoscope that he has looked a hundred times or more before his eyes have finally learned to convey to his mind an intelligent message of what was observed; that is, one looks but does not see.

Having determined, either directly or through another, the actual condition, however, and there being no posterior urethral complications, the treatment is simple, though frequently not of short duration. The proper procedure is dilatation, gradually increased to the limit of toleration, gentle massage, and irrigation with solutions. These cases must not be hastened, for, as in many other urethral conditions, the very effort at haste defeats its own ends. In many places deliberateness has been and will be emphasized, but deliberateness can be secured only under conditions where many men are undergoing treatment at one time, thus deriving mutual moral support to persist.

Granulation patches are not only responsible for many a persistent urethral discharge, but even when no discharge is present they are the cause of many uncomfortable sensations, variously described as itching, burning and crawling. These sensations persist in some instances for years, frequently causing intense mental distress and persistent demand for relief. Diagnosis is to be made with certainty only through the endoscope, though it may be surmised from the bleeding following the use of a sound. Upon inspection one finds the normal striae not only absent, but he may also find it necessary to repeatedly dry the surface before inspection is satisfactory. The surface may be bright red, glistening, and studded with exceedingly minute granules, hardly more than erosion; again, the granules may be so large and the soggy tissue so bulge into the end of the tube that the picture is not unlike that of a mass of hemorrhoids. Treatment, consists of dilatation and applications of 10% nitrate of silver solution direct to the granular patches.

Folliculitis. Of all chronic urethral conditions defying the ordinary methods of treatment, such as dilatation, instillation and irrigation, none is more discouraging than folliculitis. The reason is obvious; the glands of Littré are, as has been stated, long and tortuous, and with an exceedingly narrow opening. In some instances there may result merely inadequate drainage, while in others the opening may become completely sealed over and result in small abscesses. The crypts of Morgagni also harbor infection for years.

Diagnosis is possible only through the endoscope. The instrument, drawn slowly forward along the canal may suddenly show the field flooded with pus—and at the end of the small tube one or two large drops is sufficient to obscure the whole field. The field is dried, and through painstaking search the offending gland or follicle is found.

Treatment based upon the recognition of the pathology may follow several lines. The simplest is gentle massage over a sound. Generally, however, results are most satisfactorily obtained by direct application through the endoscope, of pure crystals of silver nitrate. These applications will suffice if the gland is not too tortuous, or where not infected clear to the base. In selected cases it is, however, best to completely destroy the gland with the high-frequency current by means of an electrode thrust into the depth of the gland.

In brief, these are the conditions encountered anterior to the external sphincter. The membranous region, embraced by the sphincter, is less frequently the seat of pathological changes than the portions before and behind it. We have then to consider the chronic conditions peculiar to the posterior urethra:

Colliculitis; Changes in the Montain Spaces; Prostatitis; Vesiculitis.

Colliculitis, or inflammation of the veru montanum, is a condition the pathology of which is so variant that, previous to the invention of the water-dilating urethroscope, it could not be even surmised. Normally no more than a small elevation, through disease the colliculus assumes most fantastic shapes. It may be the seat of granulations and of polypus-like growths. These result in frequent and distressing urination with terminal pain, and occasionally blood cells are found in the urine. Or, again, the symptoms are merely those of neurasthenia, that convenient title under which so many cases are grouped when there is no obvious peg upon which to hang a diagnosis.

Ordinary methods of examination, even including cystoscopy and dry endoscopy do not throw light upon the condition, and it is only when brought under sight by the highly magnifying close-vision instruments that the changes may be recognized.

These patients suffer both physically and mentally; their cure, while frequently somewhat prolonged, is certain, and in the end we find them changed individuals. Treatment consists of direct application of pure nitrate of silver, fulguration in selected cases, and dilatation.

Changes in the Montain Spaces. In the prostatic urethra we discover besides the veru montanum two depressions—the post-montain space, lying between the vesical sphincter and the veru, and the pre-montain space anterior to the veru. Both these spaces are subject to polypoid growth, ulceration, and chronic low grade inflammations, the symptoms of which do not differ from colliculitis. Diagnosis is to be made by direct inspection only. Relief and cure are possible through applications of silver nitrate, in the inflammations, and by fulguration in the polypoid changes.

Prostatitis. Of the chronic after-effects of gonorrhea the most common, and the most difficult of cure is chronic prostatitis. So obstinate is this condition, so stubborn in its resistance to treatment, that more than one urologist has become as thoroughly disheartened as his patient, and, it has happened, has regretted the day he undertook its treatment.

It may be admitted frankly that the problem is a hard one; occasionally absolute cure is impossible, but on the other hand many patients are cured, where they have been persistent and faithful.

As in other conditions, here again one finds the continued necessity for laying stress upon diagnosis. Other regions must be excluded, especially the vesicles, and this is done through palpation and microscopic examination of the expressed secretion. Anyone can palpate the prostate, but who can tell what he feels! The touch must be highly trained, and it must keep constantly trained by the practice of massaging many prostates every day, for, so easily lost is the tactile discrimination, that even a few weeks interval without practice makes one doubtful about what he feels.

The diseased prostate is either small and hard or else it is large and boggy, while the normal prostate gives a sensation of resiliance; its margins are clearly definable and the intra-lobular depression is evident.

As regards the microscopic appearance of the prostatic secretion; it is a waste of time to search for the gonococcus, for even when found, it has undergone changes which make it atypical. The presence of true pus cells is sufficient. The degree of chronicity is to be judged by two points—the proportion of pus cells and of lecithin. Pus of more than two or three cells to the field of a stained specimen means prostatitis. Lecithin, a normal constituent of prostatic fluid is, as the gland becomes more thoroughly diseased, the last thing to disappear and, with improvement, the first to reappear. Lecithin is to be searched for in the wet specimen.

Treatment requires massage, dilatation and instillation over a long period—months, sometimes, years. There is only one way patients will submit to such prolonged treatment, and that is where they are treated in numbers, where they meet each other in a waiting-room, and where they are aware of the persistence of many undergoing the same course. They take courage from one another, an encouragement not to be had any other way. Treated singly, they continuously harrass their medical attendant to the point of distraction with demands as to when they will be well; treated in large numbers, they are satisfied to go on as they see others going on.

And the practically incurable cases—should they continue treatment? The answer is that through the regular emptying of their diseased prostates they experience a sense of "well-being" which otherwise they can not have; many of their neurasthenic symptoms leave them; they more nearly approach the normal than when they forego their treatment.

Seminal Vesiculitis, more commonly than not, goes unrecognized, and when present is frequently diagnosed prostatitis, with the result that a quite inoffensive prostate is massaged with no consequent relief. The seminal vesicles, through their poor drainage facilities, harbor infection for an interminable time. It is of no importance that the organism may not morphologically be a gonococcus for, as has been shown by Smith, the gonococcus is subject to involutional and evolutional changes—it is sufficient that either pus or an organism of any type be demonstrated.

The cure of seminal vesiculitis is at best difficult. Sometimes it yields to stripping and installations, again these are insufficient and operative interference is to be considered. The operation of choice is vasotomy and instillation of the vesicle with an antiseptic. Vasotomy certainly gives immediate relief in the epydidimitis consequent upon a vesiculitis, and its results are such as to make it well worthy of consideration in every stubborn case.

These, then, comprise the more important complications that make miserable the lives of that one-fifth of the male population who suffer as the result of their previous gonorrheas, and for whose relief it is right that intelligent efforts should be made.

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THE NEED OF MILITARY INSTRUCTION IN MEDICAL COLLEGES—OUTLINE OF A COURSE.

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At the outbreak of the world war, a campaign which for the first time in our history taxed our resources in men and materials, the medical service, not unlike all other line and technical corps of the army, was wholly unprepared for a war of magnitude.

The Regular Army, too small numerically to fill all administrative and tactical offices, left the professional care of the sick and wounded to the civilian colleagues who entered the service.

As many were needed for service with the new National Army regiments, ambulance companies, field hospitals and evacuation hospitals, training camps were established in which the new medical officers were given instruction in those military duties as are part and parcel of every physician serving at the front.

With this phase we are not concerned in this article, but what can be pointed out is that the strictly professional side of modern warfare is a science *sui generis* and that those who had not paid any attention to military surgery went in with whatever degree of skill they happened to possess as civilian practitioners.

In the base hospitals this lack of knowledge was not so striking because the class of injuries one has to deal with in such institutions presents problems which any general surgeon with a solid grounding in the principles of modern surgery can solve without difficulty.

It must not be forgotten that patients seldom reach base hospitals soon after the receipt of injury. As a rule, these patients have run the gamut of sanitary formations at the front from the regimental dressing station on the firing line to the main dressing station, the field and evacuation hospital and that only such patients are evacuated to the base hospitals who show conditions not likely to heal in a short period. This applies especially to infectious injuries involving large joints, nerves and blood vessels. The base hospitals will present opportunities to rid the wound of pus, to repair by plastic surgery loss of substance and occasionally to perform aneurysmorrhaphies, neurorrhaphies, thoracotamies, re-amputations, and the like.

At the front laparotomies, the surgical sterilization of wounds with or without primary suture, the treatment of fractures, including those of the skull, the control of hemorrhage and shock, etc., afford a variety of surgical activities, which in many respects, differ a good deal from those practised in civil hospitals.

Instruction in military surgery, during the last war at least, was not given systematically to the medical officers who did not enter the army through the training camps.

During my service in a division training camp from August, 1917 to the end of April 1918, I have seen countless books on all sorts of military problems distributed by the War Department but not a single pamphlet or instruction on military surgery. The surgeons in the base hospital did their peace surgery there, there were some talks by competent surgeons on field work and it was not until the Division Surgeon received a pamphlet on the extension splints used in France from a friend abroad that the writer was given an opportunity to talk on the treatment of fractures. Indeed, when these splints were given out in very small quantities to regimental surgeons and sanitary units a few days before the Division entered the battle area, they were new to most of us and drill and practice did not begin until the eleventh hour.

It will not do to say that a surgeon should be a surgeon in the field as well as in the operating room of a modern hospital. The civilian has not the problems encountered by the surgeon in the field. In civil life, even in so-called emergency cases, which seldom occur on a large scale, the question of providing shelter and food and care and implements is a simple one, once the patient reaches the hospital, and that is too simple a problem to merit another word. In war, distance, transportation, and supply of necessities are of utmost importance and, in addition, there are distinct limitations to surgical activities at the front. Individualism, which is the pride of modern surgery, is impossible, and, what is more, forbidden in the army except, of course, in base hospitals.

It follows that even a surgeon of unquestioned skill must be familiar with field conditions, as applied to the surgical practice at the front. In the event of another war we may not be so fortunate as we have been in 1917, when we had at least some time for preparation.

Is it not then the duty of every patriotic physician and surgeon likely to be called upon to serve in defense of his country, to prepare himself in time of peace so as to be able to respond to the call of his country, and render efficient service without further preparation? Those now in practice can secure the desired information through books, through "The Military Surgeon," the official monthly journal of the Association of Military Surgeons of the U.S., membership in which is open to all doctors who have ever worn a military uniform.

But the most useful step I can think of is the instruction of our senior medical students. In twenty-four hours the entire subject can be covered in an exhaustive manner without tiring the hearers by unnecessary details. This will not only be a patriotic step on the part of our medical schools, but, as can be seen from the following proposed schedule it will prove of great value to our future colleagues, since there is much that will be of use to them in civil practice in what they will hear and learn.

Indeed, military surgery is entirely based on civil surgery but it also enriches civil surgery in that it shows what can and should be done when facultative and regular methods of choice cannot be adopted for economic or other causes. As for the teachers, there is hardly a large city that does not boast of a few men of military experience who could creditably give the course, as submitted below.

Certainly the Surgeon General of the Army will not refuse aid and advice when sought by medical schools in good standing.

Lecture 1.—The Army of the United States in War. The relation of the medical service of the Army to the entire military service. Organization and equipment of the medical service.

Lecture 2.—Recruiting service. Vaccination against variola and typhoid fever. Special vaccinations. Mental observation of the recruits. Final examination.

Lecture 3.—Hygiene of the camp and bivouacs. Hygiene on the march. Clothing, Food, Exercise, Venereal prophylaxis.

Lecture 4.—Camp diseases, their prevention and treatment.

Lecture 5.—Military psychiatry. Malingering.

Lecture 6.—Military surgery: Definition. Division of War Surgery under combat conditions and in quiet zones. First aid on the firing line.

Lecture 7.—Weapons and missles. Their effects on the human body.

Lecture 8.—Surgical activities at Regimental Aid Posts. Treatment of Shock, Hemorrhage. Prevention of tetanus. The military dressing. The immobilization of fractures.

Lecture 9.—Anesthesia, Asepsis. The mechanic sterilization of wounds (débridement).

Lecture 10.—Infections and their treatment with special reference to the Carrel-Dakin method.

Lecture 11.—Gunshot wounds of the head: diagnosis and treatment. Consideration of the transportation of the wounded.

Lecture 12.—Gunshot wound of the neck, including trachea and esophagus.

Lecture 13.—Gunshot wounds of the chest. Treatment of complications (hemothorax, pyothorax).

Lecture 14.—Gunshot wound of the abdomen. Classification. The relative value of expectant treatment and laparatomy. Indications and contraindications for either.

Lecture 15.—Gunshot wound of the abdominal viscera, exclusive of the urinary tract.

Lecture 16.—Gunshot wounds of the bladder and rectum.

Lecture 17.—Gunshot wounds of the spine.

Lecture 18.—Gunshot wounds of bloodvessels and peripheral nerves.

Lecture 18.—Gunshot wounds of the extremities.

Lecture 19.—Secondary hemorrhage.

Lecture 20.—Transportation of the wounded; Litter, Ambulance, Sanitary trains and ships. Improvisations.

Lecture 21.—The principles of military surgery as applied to industrial and emergency surgery.

Lecture 22.—The principles of sanitary tactics affecting surgical activities.

Lecture 23.—Discipline and military status of the medical department of the army.

Lecture 24.—A few hints on the administration of field and base hospitals.

Millions for Surgical Dressings.

Every bandage, compress, pad, and other surgical dressing used for the wounded American boys in the war were furnished by the Red Cross; for the American Red Cross was the sole source of supply of surgical dressings, accessories, and miscellaneous articles for the Medical Supply Department of the American Expeditionary Forces.

Countless numbers of nimble fingers in America and France worked day and night that this supply might never fail.

From August 1st to December 1st, 1918, the American wounded used 1,544,370 dressings.

REDUCING MORTALITY AND MORBIDITY IN ABDOMINAL CONDITIONS.*

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This is a subject that should be of interest to the general practitioner, the internist, the gastro-intestinal specialist and the surgeon.

Among other recent literature indicating its timeliness is a paper by W. J. Mayo. In discussing surgery of the intestinal tract he says that fifteen years have been added to the span of human life since the Civil War, and that fifteen more may be added in the next generation.

John B. Deaver, not long since, in a paper on acute abdominal conditions, says that the mortality of acute surgical abdominal diseases is entirely too high.

A Dr. Brown heads a paper with a title that makes one want to read it: "Late Results of Supposedly Successful Operations on the Digestive Tract."

Balfour analyzes the reports of Actuary Hunter on "Life Expectancy" on patients following operations for gastric and duodenal ulcers performed at the Mayo Clinic. He brings out some interesting comparisons between these operated individuals and the general public of the same ages.

An intensely important fact of this discussion is a statement by high authority that out of ten patients presenting with stomach complaint only one has a gastric lesion. The remaining are in three groups:

First: Those with reflex gastric symptoms, as from the appendix, gall-bladder, Lane's Kink, etc.

Second: Disorder of the nervous system, as tabes, neurasthenia, etc.

Third: Constitutional diseases, as tuberculosis, cardio-nephritis, the anemias and many others.

From a surgical point of view it must be borne in mind that it is *not* how good an operation is performed, but how *much* good will come from the operation after it is performed.

The abdomen undoubtedly contains more problems for the profession than any other portion of our anatomy. It presents opportunities for the use of many valuable adjuncts in determining diagnosis and treatment.

In many instances the question is too perplexing for one man to decide and should have much time and study. In other instances quick decision and quick action means saving a life. A clinician who delays action until all known tests and an ultra-scientific diagnosis are made may lose the golden opportunity.

The most frequent cause of mortality in acute abdominal conditions is appendicitis, and much has been written on acute appendicitis until a few years ago, since when a lag in the literature is noticeable. Internists and surgeons are now agreed that immediate operations in all cases will save most lives. But we are interested as well in the unnecessary operation, where a mistaken diagnosis jeopardizes the life of the patient, e. g., in right lobar pneumonia with pain in the abdomen, vomiting, fever, high leucocyte count, rigidity of muscles, etc. Other examples are renal calculi, typhoid and shingles. Care in diagnosis should obviate most unindicated operations.

We grant that with good, clean surgery very few deaths should occur from mistaken operations, but mistakes cause the constantly increasingly enlightened public to lose confidence in the medical profession and therefore provide more chances for cults to gain foot-hold.

Strangulated hernia is now not quite so common a cause of death as in the past, but every death from such is almost always one too many. The technique of herniorrhaphy and the employment of local anesthesia make it a safe procedure.

Perforations of the gastro-intestinal tube demand diagnostic acumen and often require a confidence of the surgeon in his opinion strong enough to insist upon exploration, which must be done promptly to save a life. Duodenal and stomach ulcer and typhoid perforations are most frequent types of this condition, even though the latter is becoming a rarity thanks to preventive medicine. Acute intestinal obstruction has its difficulties, but early appropriate surgery means saving lives.

Ruptured extra-uterine pregnancy is another condition that happens in the "acute abdomens," and may be puzzling, as also may be a twisted pedicled ovarian cyst.

Acute cholecystitis and pancreatitis are fairly common and may be exceedingly hard to diagnose and harder to determine what to do at operation and when to do it.

There are many other acute abdominal conditions where surgery or other appropriate treatment may prevent an occasional death, although the above-mentioned are the highest "toll-takers."

Most of these conditions have a *past*, and they might have been remedied before the emergency made surgery necessary.

Deaver says in the question of diagnosis of "acute abdomen" three things are very important, viz:

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*Read before the Southern California Medical Society, April 3, 1920.

First: Experience.

Second: Careful history.

Third: Examination. Certain adjuncts correlate the three, as blood count, x-ray, etc.

In these acute conditions the adjuncts that may be of value must be proven ones and not mushrooms, and should be immediately accessible and always resorted to, if any question presents and if time permits.

Most of the causes of "acute abdomen" are distinct and the indication for treatment is unquestioned, but it is occasionally a case for the clinician's judgment as to whether to operate or not, in this life-saving game. The late Maurice Richardson's saying, "too late for an early operation and too early for a late operation," often applies in acute abdominal affairs, especially the inflammatory conditions when localization is possible. In the outset I said early operations for appendicitis is the rule, but some one says, "it takes the exception to prove the rule," and here we have it in certain stages. The method of Ochsner of absolute peristaltic rest, of Fowler's position, and of Murphy's rectal seepage of fluids for temporary sustenance, will save a life when immediate operation might cause death. This is especially true of the third and fourth day of acute appendicitis.

The above exception does not hold in the perforations of the gastro-intestinal tube as it does in inflammations.

The operator who always gets the appendix in pus cases will occasionally lose a patient through his misdirected zeal.

Many questions, minor in importance, might be considered as to technique, etc., that are comparable to the adage of, "look out for the nickles," but we shall go on to a consideration of the chronic abdominal diseases.

What to do for a patient who is a chronic invalid, semi-invalid, or psuedo-invalid from abdominal complaints in order to save him from an unnecessarily early death and to prolong his life in comfort and usefulness is a question big and important enough for a symposium.

What shall we do for them, which ones are in danger if treated expectantly and which are likely to furnish unnecessary risks if operated upon,—risk of increased invalidism or even death itself?

Probably the most frequent cause of chronic invalidism of this kind is constipation, and a real physician who can enforce his advice along lines of education, diet, the taking of oil and agar, etc., is the benefactor of humanity, though a definite, dangerous-to-life lesion should be considered, and if likely, thoroughly searched for, until found or proven not to be present.

In a big subject like this I cannot deal with every phase, but merely try to hit the high points—where most deaths occur when surgery did not have a chance to save, or, if you will, when surgery was unnecessarily resorted to and a life lost or a patient not relieved, or even made worse.

This discussion will concern the decision of what method of procedure is best in these cases, in fact, *to operate or not to operate.*

Beginning at the upper part of the abdomen we may start with the hardest problem, that of gastric and duodenal ulcer.

When does ulcer endanger the life of its owner more than a surgical procedure to cure it, and will surgery cure or give symptom-relief and remove the danger of death? What can medical treatment do? All of these are problems that are put up to us constantly for a conscientious intelligent answer. W. J. Mayo says he operates after seven or nine absolute cures by medical treatment, which I think well puts the question where I feel it belongs, viz.: in most ulcers, if no evidence of hemorrhage, perforation or retention be present, let the medical man keep them comfortable. Let him clear up all foci of infection, especially in the mouth. After a sufficient number of symptom-recurrences, even if no definite obstruction or hemorrhage or perforation be present, I say operate. I have already as much as said operate for the three above-named conditions, but I do not believe in operation just because an ulcer is diagnosed.

The x-ray and the chemical study of the gastric contents should frequently be resorted to, first, to aid in guiding the treatment by determining the status of the three conditions above suggested; secondly, to earlier diagnose the beginnings of malignancy, especially carcinoma on the gastric side of the pylorus.

As illustrating some principals of handling these cases I shall give a few brief extracts from cases:

1. Smith, thirty-nine years of age, with the history of appendicitis going to abscess-formation, drainage and, a few years later, a second operation for adhesions. He came to us with a long history of indigestion and incapacitated. He had a tender mass in pyloric region, occasional vomiting of food eaten days ago. X-ray showed almost complete stasis at twenty-four hours and a definite lesion obliterating the cap. Hemorrhage occurred and was such that surgery seemed to be demanded to save life, as all other methods had failed to check it. Exploration revealed an inflammatory mass in the duodenum which was removed, to a great extent by cautery, and closed over and the usal type of

gastroenterostomy done. Patient had a rapid recovery.

2. An elderly woman had a very similar history and hemorrhage and was operated upon under much the same circumstances with the same result.

Both cases had large masses that were palpable and with hemorrhage suggesting malignancy, though neoplasm is not so frequent on the duodenal as on the gastric side. In each instance rather thorough cauterization was done after removal of tissue for examination. In both instances the pathologist's report was inflammatory tissue, not malignant, and the patients' conditions are proving the correctness thereof.

Mrs. F., sixty-three years of age, a long sufferer from "stomach trouble" and gas pains, had gone the limit of her endurance and rather take a chance. Gastric analysis and *x*-raying at different times did not absolutely prove a gross lesion, but a summing up of all evidence by Dr. Pollock, decided on surgery. Operation: Gall-bladder normal to feel and appearance. Medium-sized stone, irregular shaped, in common duct. Duodenum showed old ulcer that had perforated, and as Dr. Zochart stated, a perfect job of "vulcanizing" of omentum over ulcer, some contraction but not obstructing of pylorus. Appendix kinked and containing large fecolith. The appendix removed, the stone removed from the duct and opening closed. Ulcer on pylorus not covered by adherent omentum became red by rubbing, as it was an anterior surface and near pylorus. The removal by cauterizing would leave a constricted pylorus. I selected as the best procedure the pyloroplasty devised by Horsley and it worked out perfectly as an operation, and the result of the operation has proven thoroughly satisfactory. With the present situation the only thing to do was done, i. e., drain the gall-bladder until the common duct healing was complete.

Gall-bladder disease is rather hazy in its manifestations and often elusive..

There may be at times a history that is very definite, coupled with signs and *x*-ray findings equally definite. Again none of these three may be even suggestive and yet a gall-bladder full of stones and pus may be present, expressed only by general ill-health, symptoms of indigestion and a heart that is manifestly floundering. But is the indigestion due to poor circulation from a heart damaged by infection from teeth, tonsils, etc., or is the gall-bladder the disrupting cause? I believe it is generally conceded that many heart involvements are secondary to infected gall-bladders and yet positive evidence is not possible and so we must use our brains and take a chance occasionally.

Babcock has given us much valuable information along this line and many of our best internists believe that infection in gall-bladders has a predilection for heart muscle. Cholecystitides with or without stones certainly do account for much digestive disturbance of the vague type and cholecystectomy, with its low mortality, is usually very gratifing in results.

In present day surgery for the lessening of mortality and especially morbidity, the gridion incision is obsolete, and the right rectus incision is the one which gives opportunity to reach the trinity of digestive disturbers—appendix, gall-bladder and pyloric region. It also serves a greater purpose in women in dealing with pelvic disease when it is unexpectedly found.

We in the surgical field constantly seeing benefits from properly executed appropriate surgery do possibly become over-enthusiastic and are fortunate in having a conservative internist as a check on our over-zealousness. The surgeon, internist or family physician must follow up cases and not let a morbidity occur unnecessarily.

The Mayo Clinic says that 17 per cent. of cases coming there had not been diagnosed; that 87 per cent. of tabes cases have had abdominal operations and also that 18 per cent. of the tabes do not give a positive blood Wassermann reaction. All this proving that we cannot even with all our valuable skill and auxiliary methods of precision, diagnose every case and may have to explore.

I stated in discussing acute abdominal conditions that many acute conditions have a past. It is obvious, per contra, that many acute abdominal conditions, if they get over the attack, become chronic. The management of these chronic cases is at this moment under discussion not only as to relieving the symptoms they are producing, but as to preventing an acute affair that may result disastrously. It is then not a question of curing morbidity, but of preventing mortality in some of these situations, and I hold that properly adapted and executed surgery is *demanded* in *many* such *desirable* and more safe in others, than medicinal, conservative or expectant treatment.

Exploratory operations are not needed in some cases now that would have been years ago on account of the *x*-ray and other advancements. But with improvements in technique, exploration is attended with but a minimum risk and often reveals what is absolutely impossible to demonstrate in any other way. Therefore it must still hold an important place in our life-saving and health-restoring endeavors.

This is especially so where a heart is badly functionating and the gall-bladder is suspected as the cause. A local anesthetic may be used, the gall-bladder drained if found offending, and later cholecystectomy performed when the heart improves.

Cancer of the abdominal viscera is quite common at an age when man is about at his zenith of productiveness. To be able to give him a few more years to perfect home conditions and business enterprises is worthy of our greatest efforts at early diagnosis and justifies taking long chances surgically, possibly aided by radiation, to prevent an early, agonizing death. We should take a chance in the face of probably a high operative mortality rather than have a certain period of morbidity with early death inevitable.

To prevent illness and deaths from conditions referable to the abdomen we must emphasize more the need of thorough history taking, more complete physical examination and the use of our laboratory equipment in all cases except the emergencies and their experienced brains and prompt action.

A SUGGESTION CONCERNING THE TRAINING OF THE GYNECOLOGIST.

E. M. Hawks, M.D.,

New York City.

The policy of initiating a young man into a specialty and training him within its lines exclusively is, I firmly believe, a bad practice. It produces a man who might well be called a "limited surgeon" —one of narrow training as distinguished from a properly developed specialist. It limits his technical experience and narrows his appreciation of clinical pictures. This is true especially in gynecology in which a broad knowledge of abdominal surgery and well balanced consideration of symptoms is essential to the welfare of the patient. Before a man specializes in gynecology he should spend at least five years in medicine, neurology, general surgery, orthopedics and obstetrics. The experience could well be had in that order and in the proportion of one year in medicine; six months in neurology; two years in general surgery, six months in orthopedics and one year in obstetrics. Ten years, some might say, would be better. On such a groundwork we could hope to develop a specialist whose judgment should be sound—a man who could weigh well a woman's complaints and meet fully the requisites of gynecological surgery.

It is both unwise and impossible to expect a man to be a safe specialist if he be trained entirely within the lines of his chosen field, particularly if it be gynecology. Too often he will interpret medical, neurological or orthopedic conditions in terms of pelvic surgery. Likely he will do too much and too radical plastic work in the child-bearing period. Rarely will he be able to meet the emergencies of intestinal surgery that will result from his abdominal work. The life of a patient will at some time depend upon his treatment of intestinal obstruction.

There is a feasible way in which to give the young man the necessary training. It could be done by an interchange of assistants among hospitals.

What is true of gynecology in relation to the other branches is also true of those branches in relation to gynecology. The man who intends to practice medicine, neurology, obstetrics or orthopedics should be trained in gynecological diagnosis, and the general surgeon can learn from the pelvic surgeon. In fact there is a great deal to be learned in each branch and a mutual interchange of assistants in preparation for their final specializing in any line might be desirable.

The young man should be given his appointment first so that he will work toward his goal, but early he should be "farmed out" and encouraged to lay a broad foundation. His appointment in a gynecological service should be considered the equivalent of a similar appointment in another branch and the places should be interchangeable. If such were the case the improvement in the training of the young hospital physician would be great and the relationship between hospitals would be more cordial, particularly between the general and special services.

While the young man is in the out-patient department of his own service he could be placed for the required time in the out-patient department of a medical, neurological or orthopedic service. In return a man from the hospital to which he went could be given a place in the out-patient department of his service. He could probably secure a place that would not conflict in time with his work in his own hospital. He would then learn, for example, the various interpretations of common symptoms, such as backache, headache, local pains, indigestion, constipation, dysmenorrhea, etc. While he is an assistant surgeon and after he has had some experience in the operating room he could be exchanged outright for a man from a general surgical or obstetrical service for a considerable length of time. He would still have his original appointment first in his mind and report often to his chief. Also he would attend, if possible, his own staff conferences. Finally he could return to his own service and his fellows could well recognize him as fit to specialize.

The suggestion is that hospitals co-operate in giving the young specialist a broader training as another step toward a safer and saner practice of surgery.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

New York, July, 1920

AMERICAN PHYSICIANS IN THE HALL OF FAME.

The timely editorial with the above title in the June number of the Journal brings to mind the point once made by Sudhoff: "If the proof *e consensu gentium* were admissible in questions of science," then, indeed, all such matters might be easily disposed of "by popular vote." The Hall of Fame has hitherto been made up of prominent characters, much in the public eye. If American medicine is to be represented by the names of deceased physicians who were eminent in science as well as prominent in other ways, in other words, if such inclusion is not to be a queer joke at the expense of the illustrious dead of our profession, who are not here to defend themselves, the question of decision is of some importance. If the list is to be made up of respectable names, which might, any one of them, be duplicated by scores of others of equal merit, it is of no importance whatever. Excluding the name of a candidate still living, and therefore not eligible, the principal merit of the list submitted in the newspapers is that the names are arranged in alphabetical order. It is very much as if Gower, Skelton, Peele, Suckling, Akenside, Rogers, Praed and Coventry Patmore were exalted above Chaucer, Spenser, Shakespeare, Milton, Shelley, Wordsworth and Keats, or as if Dussek, Cramer, Kalkbrenner, Döhler, Hummel, Pleyel and Sep. Winner were preferred to Bach, Händel, Mozart, Haydn, Beethoven, Wagner and Brahms. Not that we have so far produced a Harvey, a John Hunter or a Virchow; but the question of relative "greatness" in meritorious men was never, cannot be, decided by you or me, but decides itself, depending, as it does, upon the indefinable "eternal fitness of things," which is the equivalent of the principle of relativity in science. The status of Sydenham, in relation to his time and country, was not decided by his contemporaries, who ignored him, but by his peers in the following century; his status in relation to our time is sensed (by parallax) in his original description of new diseases, his rational therapy and the growing conviction that his doctrine of "epidemic constitutions" was well and truly laid. That Shelley is the greatest lyric poet of England, that he wrote the greatest English tragedy since Shakespeare, was not settled by you or me, nor by popular opinion (he has no popularity), but by the competent consensus of the poets of his century. Among musicians, most sensitive and jealous of all artists, the establishment of such values is a point of honor, a *question de métier.* Richard Wagner did not care for either Mendelssohn or Chopin, but when challenged, it was his punctilio to establish, with unerring precision and intelligence, the very real sources of their enduring merit. When Bülow sneered at the *facture* of Verdi's Requiem, Brahm's walked into a music store and examined the score. *"Bülow hat sich unsterblich blamirt,"* he exclaimed, *"so etwas kann nur ein Genie schreiben!"* Willard Gibbs, our greatest name in pure science, whose theory of chemical equilibrium is a mathematical argument of the quality of Newton's *Principia,* was hailed as a rising star in his youth by no less than Helmholtz, Clerk Maxwell and Lord Kelvin; but his fellow countrymen passed him by, and he was actually introduced to America by Ostwald, Le Chatellier, Van't Hoff and the physical chemists of the Dutch school. It was not so with Pasteur, whose preëminence in French science was once decided by a *plébiscite* of his intensely patriotic countrymen. The true status of eminent American physicians has to be estimated by relativity, i. e., by sets of coördinates or parameters referable not only to the best American medical opinion, but equally to views entertained in Europe, which, as Jacobi once said, "is also a part of the world." Had such a tentative list been prepared by Jacobi or Welch, we should have had expert opinion by men better acquainted with the ins and outs of American medicine than any others.

In the alternative names which have been chosen by the editor there can be no manner of question about two: Beaumont, founder of American physiology, and Marion Sims, creator of modern operative gynecology. There may be matter of choice between McDowell, the precursor, and Sims, the founder, but the status of Sims was settled long ago, in England, Germany and France, as well as here. Beaumont's work at once silently took its place in the text-books before its merits were elaborated by Osler and Vaughan. In the scientific annals of the Medical Department of the United States Army alone there are at least six names which deserve a place in any pantheon, viz., Beaumont, Leidy, Weir Mitchell, Billings, Sternberg, Walter Reed. Joseph Leidy, our greatest name in anatomy, descriptive biology and palæontology, was an acting assistant surgeon in the Army at the Satterlee General Hospital during 1862-5, leaving many records of his work in the Medical and Surgical History of the War. While on duty in hospital he noticed, like Ambroise Paré at St. Quentin, that wound infection may be transmitted from cot to cot by flies. He was also discoverer of trichina spiralis in hogs (1849), of the bacterial flora of the intestines (1851), and of hookworm in the cat (1886), from which he inferred a causal relation with pernicious anemia; and other parasites, discovered by Leidy, have been found to be pathogenic for man by South American observers. Any one of these discoveries, if expanded, would furnish forth a modern reputation. Weir Mitchell laid the foundations of his neurological work while on duty at Turner's Lane Hospital (Philadelphia). American neurology, as Dr. William Browning has recently shown,* came out of the Civil War (Hammond, Mitchell, Dalton) and may be said to have grown up in the Army. Sternberg (founder of American bacteriology and discoverer of the diplococcus of croupous pneumonia), Billings and Walter Reed need no further comment. Those of us who were at the Army Medical Museum when Reed was curator remember that until his theory of mosquito-borne yellow fever was demonstrated, no one, not even Carroll or Lazear, believed in it, except Carlos Finlay and himself. The economic and social consequences of the proof by Reed and his associates have been hemisphere-wide.

The following names seem of unquestioned merit: Beaumont (physiology of gastric secretion); Leidy (anatomy, biology, science of infectious diseases); Sims (operative gynecology); Weir Mitchell (neurology; physiology of cerebellum and knee-jerk); Billings (military surgery, public hygiene, statistics, hospital construction, medical education, medical bibliography and history); Sternberg (bacteriology); Jacobi (founder of American pediatrics); O'Dwyer (laryngeal intubation); H. P. Bowditch (*Treppe* in heart muscle, 1871; extravital maintenance of rhythmic heart, 1871; reënforcement of knee-jerk, 1890; proof that nerve-fiber cannot be tired out, 1890); Reed (insect-borne fevers). In internal medicine we have a wide range of choice between such names as Benjamin Rush, W. W. Gerhard (first clear differentiation between typhus and typhoid fevers, 1837); Daniel Drake (topography of disease, 1850-54), or J. M. Da Costa ("irritable heart" or "effort-syndrome," 1862-71); in surgery, between Physick, Valentine Mott, Senn, Gross, Bigelow and others.

Such questions would best be settled, no doubt, by the various and special scientific societies of our profession. Let us hope that they will have fair and careful consideration. Since the well-known epigram of a man of letters on the exclusion of Edgar Allan Poe from the Hall of Fame, the high-sounding expression has come to have a vague implication of something local, parochial, parietal, academic or bromidic, like the Siegesallee or the Albert Memorial. "Fame" may be "the last infirmity of noble minds," but the wise of our profession know that local and temporal fame is as uncertain and evanescent in medicine as in music—

"Greatly in opera his strains intend,
But in music we know how fashions end."

Whether included in the Hall of Fame or not, may the great names of American medicine inspire physicians to work unostentatiously, after the approved habit of our profession, with "no thought of the morrow," and to regard posthumous fame as Osler did "L.L.D.'s," or the Maréchal de Saxe his prospective election to a learned academy: *Ils veulent me faire de la Cadémie; cela m'iroit comme une bague a un chat* ("They want to make me a member of the Academy; that would suit my case like a ring upon the claw of a cat.") Better to lead a life of full activity, enjoying our vitality while we are yet alive, than

"To hear the world applaud the hollow ghost
Which blamed the living man."

F. H. Garrison.

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*W. Browning: "Sources of Intellectual Power," in Osler Anniversary Volumes, N. Y., 1919, I, 881-882.

CHRONIC ENGLISH.

Both in common speech and in technical nomenclature the slang of today is often the accepted word of tomorrow. We hope however, that "chronic appendix" will never be legitimatized; we can hardly believe that any medical dictionary will ever record that *appendix* and *appendicitis* are the same thing! "Acute abdomen" is picturesque and descriptive, but otherwise no more acceptable. "The patient had no temperature" is, of course, inexcusable, yet how often we see it in print! We have railed at these expressions before, and perhaps we shall again, for they occur, to our shame, far too often in the current publications of those medical authorities to whom we have a right to look for correctness if not for elegance, in diction. One of the most distinguished of America's surgeons is the worst offender of all!

In a printed questionnaire sent to the hospitals in the A. E. F. was this gem: *"How do through-and-through chests travel?"* The writer thereof meant, we presumed, "how do men with through-and-through wounds of the chest bear transportation?" "A chronic suppurating ear" is not as weird, perhaps, as a traveling through-and-through chest, but is it not just as easy to say "a chronically suppurating ear" or "a chronic ear suppuration"? In a recent surgical article the author not only repeatedly refers to the "chronic appendix," but also mentions "an acute operation." And why, we wonder, do so many surgeons speak of "herniotomy," which is the operation of merely relieving the strangulation in a hernia, when they mean "hernioplasty," the radical operation for the cure of hernia?

Pathology itself has not escaped assault. It has become popular in our literature to talk of "removing all the pathology" from this or that organ!

The English composition of many American medical writers is bad enough, in all conscience, without such abominations as these. One ought to be able to find in the monographs of our great surgeons evidence of as much respect for their mother tongue as they have for the "pathology" they remove or the tools with which they remove it. Not all can be expected to write with rhetoric elegance or charm of style, but all can, and should take the trouble to edit out of their manuscripts "acute operations" and "chronic ears!"

Compare the composition, the verbiage, the style of the articles that appear in American medical journals with those that are written by our British cousins. We wonder what *they* think of the American medical language. Probably they regard it as hopelessly "chronic English."

Surgical Suggestions

A Wassermann test often clears up the cause of obscure pains.

A dilated pupil may mean syphilis, but it may be an early sign or glaucoma.

Prolonged suprapubic drainage may make a bad "prostatic risk" a reasonably safe one.

To indicate a proposed line of incision or an anatomical landmark, mark it on the skin with an alcoholic solution of methyl violet and allow this to dry. When tincture of iodine is applied over this on the operating table a dark line remains. Brilliant green may be similarly used.

It is worth while to submit to diagnostic puncture with an aspirating needle every breast tumor, however hard it may feel,—unless, of course, "pigskin" infiltration, retraction of the nipple, or other outspoken evidence of cancer is present. It is rather surprising how many apparently solid tumors of the breast are cystic. Emptying the cyst by puncture is often curative but the condition should be kept under observation.

A breast thickening or tumor, often multiple, pressure upon which causes the escape from the nipple of a thick white or yellowish-brown fluid is a cyst-adenoma or fibro-cyst-adenoma; aspiration or simple removal is sufficient—although it must be remembered that malignant changes occasionally develop. On the other hand, the escape of blood from the nipple, spontaneously or on pressure, indicates the existence of a duct tumor that is a cancer or is very apt to become one; radical operation is indicated!

Of great importance in diagnosis is a complete history and an analysis of *all* the symptoms *as described by the patient*. It is a great mistake to discourage him from relating the full development of his symptomatology; and equally is it a mistake to try to force that relation of symptoms into stereotyped paths, to try to twist the symptoms as he tells them into those that, diagnostically, they might more conveniently be. Pondering over some small detail that does not seem to "fit in," some unusual feature that only the patient's description brings to notice, may well establish the clue to the nature of his malady.

Book Reviews

Physical Reconstruction and Orthopedics. By HARRY EATON STEWART, M.D., Captain, Medical Corps, U. S. Army, Division of Orthopedics; Assistant Director, Section of Physiotherapy, Surgeon General's Office; Instructor in Medical and Orthopedic Gymnastics and Massage, New Haven Normal School of Gymnastics; Attending Surgeon, New Haven Orthopedic Dispensary; formerly Instructor in Corrective Gymnastics, Teachers' College, Columbia University. Authorized for Publication by the Surgeon General of the U. S. Army. Duodecimo; 234 pages; 67 illustrations, 2 diagrams. New York: PAUL B. HOEBER, 1920.

Some of the most valuable lessons learned from the war were in the field of physical reconstruction. The lessons learned from the disabilities of wounded men are applicable in the field of civilian surgery, particularly in orthopedics. The most successful methods achieved, chiefly from the benefits of exercise, massage, vocational therapy and various other types of physiotherapy, have been of paramount value.

Stewart has presented in a concrete and definite way some of the general principles involved in Physical Reconstruction, in such a manner that he has produced a volume that lies between that of the quiz-compend and a brief text-book of applied physiotherapy. This can scarcely be regarded as a complete volume on physiotherapy, as it lacks an adequate consideration of the physical phases of the subject considered, so that a beginner would lack definite knowledge of the real principles involved or technique indicated. Diathermy, for example, is dismissed in ten lines, while the wet pack receives but five. There is an attempt in the description of various diseases to be definite and concrete in directions, but for an appreciation of the indications for treatment and the directions for instituting them, there is required a basic knowledge which is not actually provided adequately in the volume itself.

The value of the book is, therefore, limited in so far as the general medical profession is concerned, although it offers many suggestions for those directly concerned with the problems of vocational reconstruction. In emphasising the importance, however, of the field which it discusses, it offers the only possible reason for its publication. It certainly makes no contribution to the subject of orthopedics. It can scarcely be regarded as an authoritative discussion of physiotherapy, even though its publication has been authorized by the Surgeon General of the United States Army.

The Treatment of Syphilis. By H. SHERIDAN BAKETEL, A.M., M.D., Fellow of the American College of Physicians; Lieut.-Colonel, Medical Reserve Corps, United States Army; Professor of Preventative Medicine and Hygiene and Lecturer on Genito-Urinary Diseases and Syphilis in the Long Island College Hospital, Brooklyn; Attending Syphilologist and Chief of Clinics, Volunteer Hospital, New York; Genito-Urinary Surgeon to the House of Relief of the New York Hospital; Medical Director of the H. A. Metz Laboratories; Member of the American Urological Association, etc. Octavo; 158 pages; illustrated. New York: THE MACMILLAN COMPANY, 1920.

The treatment of syphilis today depends upon the administration of arsenical products in the form of salvarsan or a similar medicament. With a view to stressing in detail the best means of arsenical administration, Baketel has provided a satisfactory book for the use of the general physician desirous of securing a detailed description of the "whys," "wheres" and "hows" of attacking syphilis along safe and modern lines.

The author has been liberal in his quotation from acknowledged authorities, whose opinions apparently he accepts or uses for the purpose of providing his pointed discussion. The strength of the book lies in its attention to the minutiae of anti-luetic treatment with arsenicals. While comparatively brief in this discussion, the succinctness adds force to the subject matter and gives the reader considerable information without loss of time or information. There is much valuable material herein compiled and discussed, which makes it a very helpful book for the beginner rather than a shelf book for the purpose of occasional reference.

Common Diseases of the Skin. By G. GORDON CAMPBELL, M.D., C.M., Lecturer on Dermatology and Pediatrics, McGill University; Physician to the Montreal General Hospital. Octavo; 299 pages. New York: THE MACMILLAN COMPANY, 1920.

The author in his preface, modestly states that his purpose is to provide "illustrations and a short description of some of the commoner diseases of the skin, with a few lines on differential diagnosis and methods of treatment." With this limit in mind, the author has been successful, in that he has selected mainly those diseases which are most commonly met, particularly in the service of the Montreal General Hospital Clinic. The illustrations are excellent, well selected, clear, and, for the most part, they indicate types of diseases which are readily recognized. It might be said that if skin lesions presented themselves in as discrete and regular form as depicted in the illustrations, diagnosis would be simplified. Further difficulty lies in diagnosing and differentiating lesions which are typical in form or distribution. Familiarity with types facilitates disability in differentiating aberrant forms.

A single illustration merits criticism, in that it might be greatly improved upon, namely, the illustration of Hutchinson's teeth which is inadequate and might lead to mistaking erosions of the enamel for the characteristic peg teeth of congenital syphilis. As a whole, the book is creditable and useful as an aid in fixing a mental picture of a number of dermatological affections after a certain degree of familiarity with their clinical manifestations.

"L.-P." The Treatment of Inflammation and Sepsis by Lipoid-Paraffin Dressings. By A. WHITE ROBERTSON, Brevet Lt.-Colonel, R. A. M. C., author of "Studies in Electro Pathology." Small octavo; 83 pages. London: GEORGE ROUTLEDGE & SONS, Ltd., 1919.

The method here dealt with is intended to substitute a physiological for the antiseptic treatment of infected wounds and "inflamed and injured tissues." "L.-P." is an effort to combine with paraffin, which is toxin absorbent only, as is cholesterin, the oxidising and reducing elements of the two groups of lipins, the phospho-lipins and the galacto-lipins." Its composition and preparation are not otherwise described. "The basic idea is to follow the lead of nature in scab healing and to take a lesson from the vegetable world and learn how nature deals with vegetable protoplasm in the healing of wounds in trees and shrubs." We do not think the author has made the rationale of "L.-P." very clear.

Les Infections Gangreneuses des Membres, Consecutives Aux Plaies De Guerre. By G. LARDENNOIS. Chirurgien des Hopitaux de Paris; Medecin-Chef de l'Auto-Chir. No. 7; Chirurgien consultant de la IIIe Armée; and J. BAUMEL, Chef de Clinique médicale à la Faculté de Montpellier; Chef du Laboratoire de l'Auto-Chir. No. 7. Octavo; 218 pages; illustrated. Paris: MASSON ET CIE, 1920.

This is a comprehensive, but not too voluminous, treatise on "gas gangrene" infections of war wounds: a brief historical sketch of their incidence in earlier wars; description of the chief causative anaerobes—bac. perfringens, bac. oedematiens, bac. sporagenes, vibrion septique, bac. bellonensis, and their association with aerobes, especially the streptococci; the mode of invasion; gross and histologic pathology; the symptomatology, with especial emphasis on the early warning signs; *x*-ray findings; preventive wound management; treatment by "débridement" and, finally, the employment of specific sera evolved towards the end of the war. A complete bibliography adds much to the value of this excellent work.

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SOME ANESTHETIC RELATIONS.*

ALBERT H. MILLER, M.D.,
PROVIDENCE, R. I.

In an underground cave at the mouth of a narrow tunnel, a watcher sat silent with attention closely fixed upon a shining steel cable which rapidly sped by. The cable, passing from the power house through the tunnel to underground conduits, transmitted power to the surface cars of the metropolis. As long as the cable was intact, all went well but if some strands became broken they would tangle about the clutch of a car which would be carried along helplessly at full speed. The silent watcher noted the condition of the cable as it passed by, ready at the first sign of danger to safeguard the lives dependent upon his care. *Such is one conception of the duty of the anesthetist:—a silent watcher of the thread of life, ready to maintain the integrity of that thread by every means obtainable from study and application.* While this conception of the anesthetist's duty seems to the patient entirely fitting, many of the medical profession would consider the anesthetist an automatic dropping device or an uncalibrated valve.

PRESENT STATUS OF ANESTHESIA.

In the 74 years of its existence, anesthesia has made but little scientific progress and looks out upon an increasingly gloomy prospect for the future. The anesthetic agents which were introduced 74 years ago are still those in use today. Few improvements in methods of administration have been made and these have not been generally adopted. The anesthetic drugs are administered without regard to dosage using the patient as an index to an undefined condition styled "absolute surgical anesthesia." Only sporadic attempts have been made to determine the proper dosage of the powerful agents employed. The refined methods of the laboratory are not made use of in practical anesthesia. Blood pressure apparatus, although of proved value in determining the condition of the patient, is not in general use among anesthetists. *The degree of danger attending the use of anesthetics is still unknown. The more postoperative deaths are studied, the more evident it becomes that a considerable proportion of the mortality is directly or indirectly due to effects of the anesthetic.*

In medical schools, hospitals, and in the medical press, there is a disposition to pay *less,* rather than *more* attention to this subject. The medical preceptor who formerly gave his students instruction in anesthesia is no longer recognized. Medical schools neglect entirely to give instruction in anesthesia or dismiss the subject with an hour's consideration. How is the medical graduate whose knowledge of anesthesia is limited to an hour's study of ether administration with the obsolete closed cone to compete with the nurse who is interested in her work, has studied the literature of the subject and been carefully trained in the use of a good routine method? Can we blame the hospitals for turning more and more to these trained nurses for their anesthetists?

The neglect of anesthesia in the medical schools is partly due to a lack of competent instructors in this department. It is characteristic of modern methods of education that courses of instruction depend upon the availability of instructors rather than upon the needs of pupils.

This condition prevails while the combination of physiology and physical chemistry which provide the foundation for the study of anesthesia can be made the most interesting course in the medical curriculum.

In hospitals, the preoperative examination of patients, the choice and the administration of anesthetics are generally neglected. Recent statistics show that in 603 hospitals of the United States and Canada, in the year 1917, only 27.4 per cent. of the patients received careful physical examination; 1,546,000 patients were admitted to hospitals and discharged without physical examination. (*Surgery, Gynecology and Obstetrics,* March, 1919, xxviii, No. 3, p. 335.) In the institution where an examination is supposed to be made, the data of the examination are frequently not at hand at the time of operation and the physical state of the patient receives no consideration before the operation is performed. No wonder that the necessity for a lame explanation of an unexpected fatality frequently appears. So little attention is paid to the standardization of methods and of apparatus that not only in different institutions but in different departments of the same hospital widely varied methods are the routine. Proper consideration of this topic would show many of these methods to be crude and unscientific and would leave only one or two methods worthy of general adoption. *In many clinics only one agent and one method of administration are available and must be used regardless of the nature of the operation or the condition of the patient.* At the present stage in the development of anesthesia, the minimum provision in a hospital should be for an open method of etherization, an efficient nitrous oxid-oxygen administration, and an intrapharyngeal method for work about the face. Many institutions have not manifested sufficient interest to provide these minimum requirements. It is possible to witness delicate operations about the face performed by surgeons of great skill, in the intervals between the intermittent administration of ether with a closed cone.

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*Read before the American Association of Anesthetists, during the Eighth Annual Meeting, Hotel Grunewald, New Orleans, April 26-27, 1920.

In the larger institutions, the present conditions may be remedied through the appointment of full-time, resident anesthetists. These officers should supervise the preliminary examination of patients, consult with the surgical staff in the choice of anesthetic agents and methods of administration, supervise difficult cases, instruct juniors in practical anesthesia, and be responsible for the condition of anesthetic apparatus. The unsalaried visiting anesthetist is generally an unsatisfactory member of the surgical staff.

Instruction in anesthesia having been omitted both in medical schools and hospitals, our best trained medical men have no basic knowledge of anesthesia and no experience in anesthetic technic. We are not only neglecting to train anesthetists for present and future needs but are failing to furnish the surgeons of the coming generation with the knowledge of the fundamental principles of anesthesia necessary for the efficient performance of their work. The surgeon of the present time who employs unskilled anesthetists justifies his position by the claim that he is able to oversee the anesthesia. The surgeon of the next generation will not have had the required experience with anesthetics to uphold even this unsatisfactory relation.

The waning interest in the subject is exemplified in the medical literature. Three great medical and surgical journals, in the year 1909 printed seventeen original papers on anesthesia of which eleven were distinct additions to science. In the year 1919, the same journals published only four papers on anesthesia, no one of which could be considered of especial value. On the other hand the daily press continues to publish an increasing list of anesthetic fatalities of the most glaring nature.

REMEDY FOR CONDITIONS NOTED.

The only bright spot in the prospect for anesthesia appears in the activities of the American Association of Anesthetists and its associated societies. Presentation and discussion of papers, consideration of latest and best methods, interchange of ideas on basic principles and technic improve the individual work of the members and raise the general standard of anesthesia. The discussions before these societies is providing an unequalled library of anesthetic literature, ably edited and published in The Quarterly Supplement of Anesthesia. But to fulfill its entire duty, the activities of this association must be stimulated and extended. It must pass from the attitude of passive protest at present conditions to one of active interest in the problems connected with anesthesia. Of the nature of these activities we need not remain in doubt. The foremost medical authority of the time, after an unequalled experience and from an exhaustive study of present conditions has already made the recommendations required for future improvement in the anesthetic situation. With his permission, I quote from an address of Dr. W. W. Keen, delivered at the Massachusetts General Hospital, October 16, 1915, ("The Dangers of Ether as an Anesthetic," W. W. Keen, M.D. LL.D., Philadelphia. Emeritus Professor of Surgery, Jefferson Medical College. Address delivered at the Massachusetts General Hospital, on the sixty-ninth anniversary of Ether Day, October 16, 1915):

"Prior to the operation the anesthetist as well as the surgeon should make himself familiar with the condition of the heart, kidneys, blood pressure, hemoglobin, and any unusual condition; should see that the mouth, tongue, teeth, and tonsils are in proper condition, and that provision be made to prevent chilling of the patient,—an important point never to be overlooked.

"During operation the anesthetist should attend strictly to his own business. He should glance at the operation only from time to time, not to study the operation, but in order to anticipate the need for lighter or deeper anesthesia and when the anesthesia may be stopped. Of course he should keep himself constantly informed of the general condition of the patient by observation of the respiration, the most important function of all, of the blood pressure, pulse, pupil, color, and condition of the skin as to sweating.

"The use of an anesthesia chart in every case. I am persuaded that a chart tends to concentrate the attention of the anesthetist upon his 'job' and make him more careful. In a few years such charts would also furnish us with very valuable and extensive statistics. The form should be full enough to make it valuable and to compel the average anesthetist to make close and continuous observation, yet not so elaborate and detailed as to defeat its own object. Instead of distracting the attention from the pataient, these records fix the anesthetists' attention much more closely upon the patient's condition than if no chart is used.

"Observation and charting of the blood pressure not only beforehand, but at frequent intervals during every important or prolonged operation, especially as a guide to the degree of shock. Accurately known blood pressure is of greater value than the rate and quality of the pulse and gives warning from 5 to 20 minutes earlier than the pulse.

"Straight ether by the open drop method as a routine method instead of mixtures and sequences. I believe all the latter to be more dangerous than ether.

"More accurate dosage of the ether on the basis of its anesthetic tension, i. e., the partial pressure of the ether vapor in the inspired air. Science began with the substitution of the balance, the yardstick and the clock, for even the most accurate guesses as to weight, dimension and time. In anesthesia the same I feel must hold good. A knowledge of this concentration or anesthetic tension cannot be obtained by observation. It must be by exact measurement in millimeters of mercury.

"Many professional anesthetists. In order that medical men and women shall devote themselves to anesthesia as a specialty, the public must be taught that safety lies in having an expert anesthetist, and that like any other expert, if he is to obtain a living as such, he must be well paid, otherwise he cannot devote his whole time to the speciality.

"The collection of statistics at intervals of five years.

"Instruction of all medical students in the theory and practice of anesthesia. Next to the surgeon and even before his first operative assistant, in my opinion, stands the anesthetist, holding the scales of Life and Death. It should be the duty of our medical schools and their hospitals to instruct all students in anesthesia and to give them experience by having them administer anesthetics under the supervision of their experts. In view of the constant and necessary change of internes there should be on the staff of each division a permanent expert. In small hospitals at least one of the staff should make it his business to become an expert by constant study and practice."

No words of mine can add to the authority of the author quoted whose name Sir William Osler has included in the list of most eminent medical men of our time. We are fortunate in having so clear an exposition by so able an authority and cannot afford to neglect his suggestions as they bear upon our individual work and the activities of our association. The status of anesthesia depends first upon the character of the individual work of those who are at present administering anesthetics. To the individual members of this association who are seeking a guide for their daily work I commend a study of the address from which quotations have here been taken. The preliminary examination of patients who are to undergo surgical operations, the choice of the anesthetic, a routine method brought to as near practical perfection as is possible with our present imperfect methods, the mastery of such accessory methods as may be required by special conditions of patient or of operation, availability of all requisite apparatus, the routine use of blood pressure tests, an efficient system of records for each case and for cases collected in series, study of the causes of postoperative complications and mortality, and the collection of fees adequate to maintain the respect of the community; these are matters of concern for each member of our association.

For concerted action by the association, I suggest:

1. Encouragement of joint sessions of anesthetic societies with surgical societies as initiated by the Interstate Association of Anesthetists and the preparation of symposiums on subjects of interest common to anesthesia and to surgery.

2. A committee on statistics. This committee cannot be expected to make great progress in the collection of statistics during the present year but can review the situation, learn what records are being kept and report to the next annual meeting on the statistics at present available and the procedures required for continuing this work. Anesthetic mortality is not reported in municipal death returns nor in hospital reports. Many of the deaths would be reported to a committee which was generally known to be interested in the question. Such returns should be designated by date and locality and not by the name of any person concerned. The action of the National Anesthesia Research Society in regard to anesthesia records promises to be of great value in this connection.

3. A committee on Instruction in Medical Schools. It should be possible to find in this association a number of men who will volunteer to prepare a course of three lectures on the principles and practice of anesthesia and to deliver them at first grade medical schools during the coming year. The work of this committee would then consist in corresponding with medical schools, finding those which are desirous of obtaining instruction in anesthesia, and bringing these schools in touch with the men who are willing to provide lectures. From some experience in this work I judge that the medical students would welcome such instruction gladly.

4. A committee on Anesthesia in Hospitals. This committee also could not be expected to make great

progress in a single year. The Council on Medical Education of the American Medical Association has made several surveys of the hospitals and has secured answers to the following questions in regard to anesthesia:

Are anesthetics in charge of an expert anesthetist?

Equipment for anesthetics?

Work of Internes, Anesthetics?

This Council has found that 584 of 801 hospitals employ expert anesthetists. It includes under the essential requirements for hospitals: "Anesthetics: The interne should obtain experience in the administering of various anesthetics under expert supervision." The National Anesthesia Research Society is sending out an exhaustive questionnaire on anesthesia in hospitals from which valuable information should be secured. The committee on Anesthesia in Hospitals of this association could cooperate with these agencies and report on the progress made to the next annual meeting. Some time ago a writer in *The Journal of the American Medical Association* reported as to anesthesia in hospitals *"during the past few years I have seen some of the most atrocious examples of this work in the clinics of surgeons of national and international reputation that I have ever observed anywhere."* (Moriarta, *Jour. A. M. A.*, Sept. 4, 1909, liii., No. 10, p. 768.) If such conditions exist at the present time this association needs to take an active interest in the situation.

5. A committee on Anesthetic Agents and Methods: A number of men competent to report on the agents and methods in use that the association may take action toward standardizing agents, methods, and apparatus and bring some order out of the present chaotic conditions. The position of chloroform and ethyl chlorid in the anesthetist's armentarium, the status of intratracheal and intrapharyngeal anesthesia, of intravenous, rectal, and spinal anesthesia, the essential features of an efficient nitrous oxid-oxygen apparatus are matters concerning which this association should have well formulated and clearly stated opinions. The committee on Anesthetic Agents and Methods has material for reports for many years to come.

The neglect of the subject of anesthesia in medical schools, hospitals and the medical press, and the indifference of the profession to anesthetic conditions must stimulate the members of the American Association of Anesthetists to increased activity or improvement in the present anesthetic situation cannot be made. The required line of action has been clearly outlined by one of the foremost authorities of the time. The recommendations of this authority should be adopted at this meeting as a guide to the activities of the coming year.

131 Waterman Street.

SOME RESULTS FROM ANESTHESIA EXPERIMENTS ON ANIMALS.*

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and
Clayton McPeek, M.D.,
Columbus, Ohio.

This paper will be the consideration of mixed anesthesia in experiments, the fundamental or principal agent of which was nitrous-oxid, because all anesthesias are very apt to be a combination of different sleep-producing drugs, the principal ones of which are ether, chloroform, nitrous-oxid, morphin, scopolamin, cocain, ethylchlorid and chloral, all of which the successful anesthetist should know how to use.

In preparing this paper we have thought it best to present it under six different headings. First, its history; second, pharmacology; third, physiological effects; fourth, technic of its administration; fifth, advantages, and sixth, disadvantages.

HISTORICAL CONSIDERATIONS.

Its history we will dismiss with a few words. Suffice it to say, that the evolution of general surgical anesthesia is steeped in tradition, and it is almost impossible to say at what period of the world's history men began to make attempts to relieve pain. It would be a pretty safe guess, however, to say that it was among some of their earliest efforts, one of the primitive modes of inducing anesthesia was by strangulation, thus producing anoxemia and asphyxia. Nitrous oxid was given to the world in the early forties of the last century. Nitrous-oxid and oxygen in 1868 by Dr. Andrews of Chicago.

PHARMACOLOGY.

Its preparation we will also briefly consider by saying that it is obtained by the decomposition of amonium nitrate into water and the gas N_2O.

PHYSIOLOGICAL EFFECTS.

Several theories have been advanced as to the way in which nitrous-oxid produces anesthesia, and it is not necessary now to take up your time by rehashing all the old theories. We are pretty thoroughly convinced by our own clinical experiences and laboratory experimentations, as well as by that of other anesthetists and laboratory men, that we have a more definite knowledge of the way in which nitrous-oxid produces anesthesia than we have about any other anesthetic.

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*Read before the Section on Physio-Pathology of the Interstate Association of Anesthetists, during the Fifth Annual Meeting, at Cincinnati, September 15-17, 1919. From the Experimental Laboratory of Physiology of the Ohio State University Medical Department.

Nitrous-oxid outside the body supports combustion, while in the tissues, other than the central nervous system, it acts like any other indifferent gas. Animals die when placed in it, seeds will not germinate in it, or plants grow, and the blood of an animal killed by it contains no oxyhemoglobin.

Nitrous-oxid has a special effect on the central nervous system by reason of the excluding of oxygen. If it were an indifferent gas, no effects should be obtained with a four-to-one mixture because ordinary atmospheric air is four parts of nitrogen and one part of oxygen.

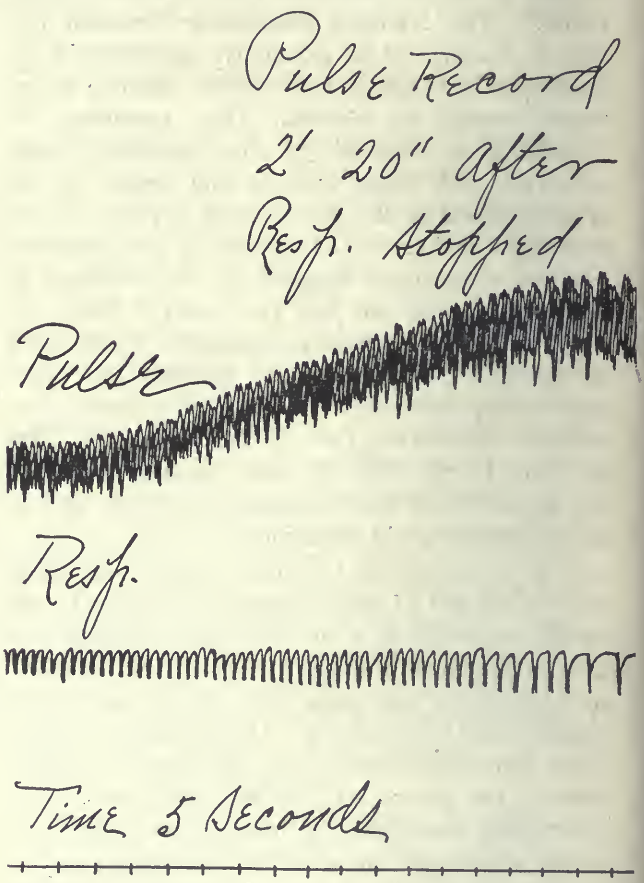
Blood dissolves more nitrous-oxid than water, apparently for the reason that it is taken up by the lipoids of the corpuscles in much the same way that chloroform is.

It is introduced by way of the respiratory tract into the lungs, when it is distributed throughout the alveoli of this organ where it is taken up by the blood, but upon which it has no specific chemical effect, the resultant anesthesia being produced by some alteration of the oxygenating processes in the human body. This sub-oxygenating process beginning back in the pulmonary circulation where, owing to the supply of oxygen being cut off, the venous blood of the pulmonary artery passes unchanged into the minute radicles of the pulmonary veins, causing more or less stagnation, which results in a general anoxemic condition that may quickly develop into asphyxiation, unless much skill is used in the proper mixing of the gases, and a much closer watch kept over the respiration, pulse and color of the patient than is necessary when using ether.

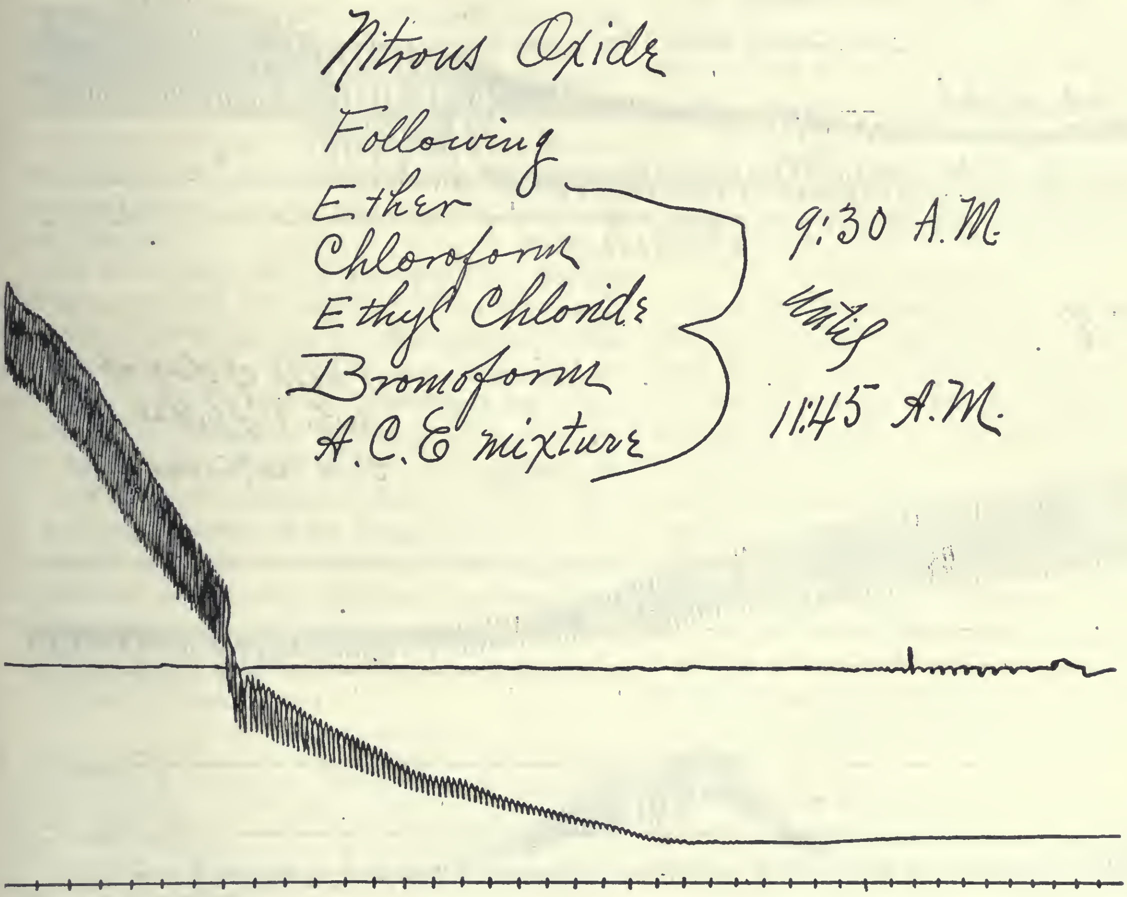
The fact that nitrous-oxid anesthesia can sometimes be produced without any apparent or easily discovered cyanosis, does not prove that anesthesia is not the result of a diminished or altered supply of oxygen, because in fact it is the increasing or diminishing of the oxygen which determines the depth of the anesthesia, and profound anesthesia is frequently obtained, especially in the very anemic, or those with a low hemoglobin test, without the slightest apparent sign of cyanosis being present—so that those of limited experience may easily be mistaken in reading the signs of anesthesia. In other words, nitrous-oxid anesthesia is a general anoxemic condition, whether cyanosis is present or not, in which the brain cells partake of the general anoxemia, thus preventing the recording of pain sensations, because the brain cells, like the pulmonary veins, only functionate in the presence of oxygen. If we had asphyxia to a lethal degree, there would be a total cessation of all the processes of life. In anoxemia we have a partial cessation or anesthesia; and if those surgeons and anesthetists who are complaining so loudly of their bad results will maintain anoxemia, instead of cyanosis and asphyxia, they will have little reason to condemn one of the greatest advances of modern surgery.

HOW DOES N_2O PRODUCE DEATH?

Nitrous-oxid when given to a lethal degree does not produce death by paralyzing the heart muscle, as has been stated by some surgeons, but by its paralyzing affect upon the respiratory center. Of this we are convinced by large clinical experience of many thousands of administrations for all sorts of surgical operations, and more recently by laboratory experiments carried on in the laboratory of the Ohio State University Medical Department, by Dr. Clayton McPeek, Assistant Professor of Physiology in that university, and myself. Our object was to determine which was the first to succumb to the use of N_2O when used to a lethal degree. In all of our experiments the same phenomena were present in every case, *viz.,* when surgical anesthesia was



produced and maintained, a beautifully rhythmical pulse and respiration were the result, but when oxygen was shut off and nitrous-oxid was used for the express purpose of producing the death of the animal, the blood pressure was suddenly increased, the respirations became more rapid and finally death ensued from asphyxia. In one case the heart continued to beat for as much as five minutes and forty-five seconds after the last gasp of respiration. Inasmuch as rescuscitation was possible immediately after the cessation of respiration, the conclusion was reached that the viability of the respiratory center was less than that of the cardiac.



Several of the dogs had one or both of the vagus nerves severed; death from a too rich mixture of nitrous-oxid showed the same features, although impulses were no longer able to travel over the vagus.

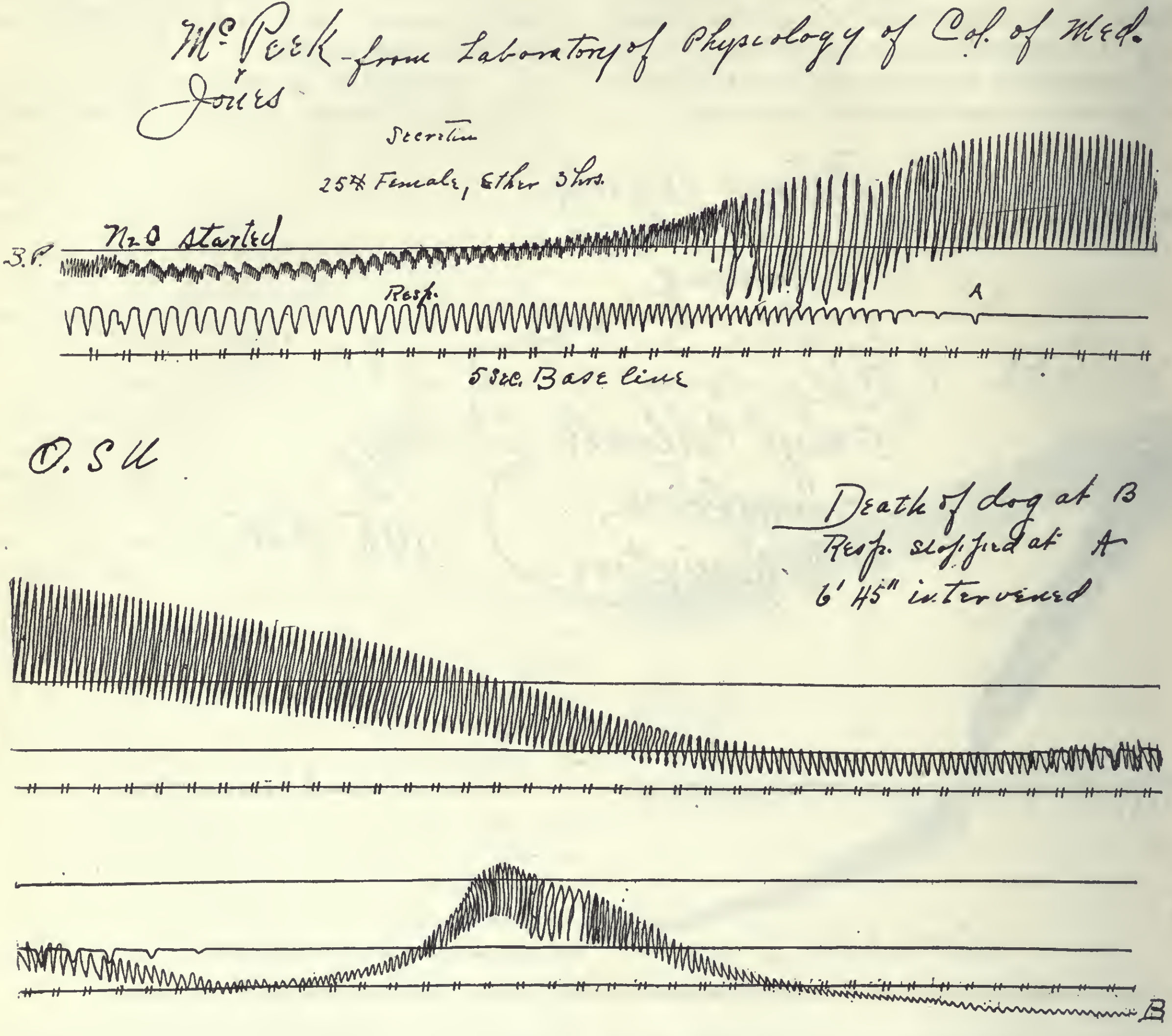
The independent resistant element of the heart muscle to oxygen deprivation must be considered as a favorable feature. According to the experiments of Bert and Martin, death results from a lack of oxygen, rather than to the presence of the nitrous-oxid. All the nerve cells are depressed, hence depression of the center is of considerable importance. In chloroform narcosis there is both a direct stimulation of the cardio-depressor center, and of the depression of the cardiac muscle fibers as well. This occurs even though the reflex paths are cut, and when the chloroform concentration reaches 0.15 per cent. the subjects (dogs) were taken irrespective of age, sex or previous condition. Some had been used as subjects for pysiologic experimentation, having had half a dozen or more drugs injected, and being under ether or chloroform anesthesia for as much as three hours. Others were taken fresh from kennels.

TECHNIC OF ITS ADMINISTRATION.

The administration of gas-oxygen, for general surgery, or for surgery of the oral and pharyngeal cavities, are similar in that a steady, even flow of nitrous-oxid, under a constant positive and low pressure, are absolutely necessary, remembering all the time that nitrous-oxid is the sleep-producer, and that oxygen is simply the agent that regulates the depth and character of the anesthesia. All connections and pipes leading from the gas cylinders should be absolutely free from obstruction and airtight. The tube leading from the mixing chamber on the gas machine should be large enough to permit the patient to get all the gas and oxygen necessary without any effort on his part. The inhaler should be large and comfortable and fit over the mouth and nose absolutely air-tight.

If the operation to be performed is, let us say, an abdominal one, the nitrous-oxid cylinders are opened and the pressure gauges turned until they register a pressure of ten pounds. This indicates to us that the gas is leaving the cylinder under a pressure of ten pounds. It is further reduced by the automatic valves from the gas machine to a pressure of not over one-half ounce. The bag should not be distended to its capacity, but should be allowed to inflate and deflate with each respiration. The oxygen cylinder should be under a little greater pressure than the nitrous-oxid cylinder.

Now, after the gases are turned on and are flowing into the bag or bags, the face piece should be adjusted, and not before, because it is very disquieting to a patient to have his face clapped into an air-tight receptacle and not have anything to breathe. It is advisable, and it is our plan, to administer several inhalations of pure nitrous-oxid before any oxygen is used, as the patient will come under the influence of the anesthetic more quickly and with less excitement after three or four inhalations of nitrous-oxid, then introduce oxygen, say two or three per cent., gradually, increasing or diminishing the amount as the case may require.



No hard and fast rule can be laid down as to the percentages of gas and oxygen to be used, and notwithstanding the claims of the manufacturers, the machine has not yet been made into whose unreasoning power the patient can be intrusted while the anesthetist enjoys the society of those around him. The patient is the thing to watch, and not the machine. This is one of the reasons, it seems to me, that some have had trouble with this anesthetic. They assume that the apparatus was all that was required, and that knowledge and experience were unnecessary. Enough oxygen should be used to prevent cyanosis, although a degree of cyanosis is not objectionable or dangerous; much depends upon the patient as to the amount of cyanosis permissible. If the patient takes the anesthetic badly, or if a proper degree of relaxation is not possible without too much cyanosis, then it is far better and safer to introduce some ether along with the gas-oxygen, than to attempt to get relaxation with gas-oxygen alone, and the amount of ether used is a pretty good indication of two things: first, the skill of the anesthetist in the use of the anesthetic; second, the willingness of the surgeon to work with some little disadvantage to himself, but more comfort and well-being to his patient. No one claims that it makes the surgeon's or anesthetist's work easier, but many of the most prominent surgeons and physiologists in the United States do claim that it is many times safer and better for the patient when these two conditions exist.

The re-breathing of the anesthetic is a distinct advantage in that it preserves the carbon-dioxid content of the blood, (the stimulating agent of the respiratory center). This can be accomplished by screwing down the expiratory or exhalation valves on the top of the inhaler, so that only a part of the new gas taken in at each inhalation is expelled and the rest of it is necessarily re-breathed again. This is another procedure in the administration of this anesthetic that calls for some intelligence and discrimination, and as every patient is a law unto himself, no rule can be laid down as to just how much re-breathing the patient can do.

185 East State Street.

THE INTERSTATE ASSOCIATION OF ANESTHETISTS WILL HOLD ITS SEVENTH ANNUAL MEETING IN PITTSBURGH, OCTOBER 4-7, IN CONJUNCTION WITH THE PENNSYLVANIA STATE MEDICAL ASSOCIATION AND THE NATIONAL ANESTHESIA RESEARCH SOCIETY. THIS WILL BE ONE OF THE MOST INTERESTING AND IMPORTANT MEETINGS EVER HELD, AND ALL ACTIVITIES WILL BE CENTERED IN THE HOTEL WILLIAM PENN.

THE NATIONAL ANESTHESIA RESEARCH SOCIETY WILL AWARD MONEY PRIZES FOR THE THREE BEST PAPERS PRESENTED ON RESEARCHES IN ANESTHESIA. THOSE WISHING TO COMPETE SHOULD GET IN TOUCH WITH THE SECRETARY AT ONCE.

ON THURSDAY AFTERNOON, OCTOBER 7, THERE WILL BE A JOINT SESSION WITH ALL THE SECTIONS OF THE PENNSYLVANIA STATE MEDICAL ASSOCIATION WITH A PROGRAM OF PERTINENT PAPERS OF INTEREST TO ALL IN ATTENDANCE.

IF POSSIBLE CLINICS TO DEMONSTRATE THE LATEST ADVANCES IN ANESTHETIC TECHNIC WILL BE HELD EARLY IN THE MORNING, PREVIOUS TO THE SCIENTIFIC SESSIONS.

ANESTHESIA IN EXPERIMENTAL SURGERY.*

F. C. Mann, M.D.,
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The large number of inquiries I receive each year concerning the technic of anesthesia in experimental surgery, and the askance with which most veterinarians view the administration of an anesthetic, leads me to believe that the successful administration of anesthesia in experimental surgery and veterinary practice, lags far behind its development in administration to man. It is my purpose briefly to present some of the data which have been accumulated in our laboratory with regard to anesthesia in laboratory animals. Since the dog is the laboratory animal of choice in experimental surgery I shall speak mainly of anesthetics for it, but references will also be made to variations in technic when administered to other species.

VARIOUS ANESTHETICS USED.

Local anesthetics may be used in experimental surgery. In our work the local anesthetic, however, is restricted to cases in which it is definitely indicated, for while it can be used successfully, it is difficult to adapt as a routine method. If it is necessary to operate when a general anesthetic would complicate the experiment, it is perfectly feasible to employ any of the best local anesthetics with the assurance that no consciousness of pain will be produced. It is important to bear in mind that the welfare of the animal must constantly be considered; the infiltration must be complete; plenty of time must be allowed for the substance to act, and the tissues must be handled with extreme care.

A general anesthetic is used in all but a small number of cases. The three most commonly employed anesthetics have been used in our work.

Too many disadvantages are attached to the use of *chloroform* as a routine measure. For example, it is difficult to train an anesthetist to give chloroform successfully, and in a large number of cases, its post-anesthetic action will defeat the purpose of the experiment. Under some very definite conditions, however, when a short, quick anesthetic is desired, chloroform may be used by those skilled in its administration.

Nitrous oxid-oxygen may be used (Dolley), but it does not maintain a constant anesthesia in laboratory animals (Jackson)[4] and its method of administration and cost preclude its routine use.

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*Read before the American Association of Anesthetists, during the Eighth Annual Meeting, Hotel Grunewald, New Orleans, April 26-27, 1920. From The Division of Experimental Surgery and Pathology, Mayo Foundation.

Ether is without doubt the best anesthetic to use for most laboratory work. Our method and technic of anesthesia has been developed for the use of this substance. Of course for purely physiologic work, many other substances such as urethrane and chlorotone may be used.

PROBLEMS CONNECTED WITH ANESTHESIA FOR EXPERIMENTAL SURGERY IN ANIMALS.

Several problems connected with anesthesia in experimental surgery are not found in the application of anesthesia in operations on man. For instance, the reaction of the various species is slightly different with the different anesthetic substances. Their reaction to ether seems to be more uniform than to any other general anesthetic. As the respiratory rate and probably certain factors with regard to the control of respiration are different in the various species, we find that slight details in the administration of the volatile anesthetics also differ. This is an important fact for the anesthetist in the experimental laboratory. Another difficulty is the usual necessity of training for an anesthetist in the laboratory someone who is unfamiliar with medicine, anesthesia, and laboratory work, and it is usually imperative that the anesthetist shall do many other things beside giving the anesthesia. These facts should be considered in selecting any method of anesthesia in the laboratory.

AUTO-INHALATION AS A ROUTINE METHOD.

Through several years of experience, we have found the method of anesthesia, herewith described, very satisfactory. It was first devised by McGrath[6] and termed the auto-inhalation method. We have adapted it with a few changes to our own particular work. The method consists in an initial etherization of the animal in a closed cabinet, intubation on the operating table, and the maintenance of the anesthesia by attaching a simple ether can to the intratracheal tube.

The pre-anesthetic treatment consists only in withdrawal of food for at least twelve hours; this is sufficient so far as the anesthetic is concerned, but it is usually necessary to fast the animal for from eighteen to twenty-four hours, depending on the operative procedure planned. The animals are given water freely. Atropin and morphin are not given, except for special reasons, it is not necessary nor advisable to administer the drugs routinely.

The etherizing cabinet is a galvanized iron box with a hinged lid. It may vary in size, but should be large enough to accommodate the largest dog. I have found it better to have it slightly larger than seems to be necessary, since this tends to prevent accidents in the initial etherization although it does require more ether. The cabinet that we found most generally useful is 75 cm. long, 50 cm. wide, and 60 cm. deep. This size is very convenient to use but larger than necessary. There are two glass windows in the lid, and a funnel leads to a sponge within a wire basket attached to the under surface of the lid. A rubber rim makes the lid fit snugly and practically air-tight. If it is necessary to administer a large number of anesthetics, two of these etherizing cabinets can be used to advantage, one large enough for the very large dogs and a smaller one for the small and medium-sized dogs.

The animal is placed in the etherizing cabinet, the lid closed securely, and ether poured through the funnel until it saturates the sponge. The funnel is then closed by setting the ether can on the top of it. The ether soon vaporizes, but the tension necessary to saturate the blood to the degree which will produce surgical anesthesia is produced slowly; the animal usually struggles little and makes practically no noise. The time necessary to produce complete relaxation varies with the different animals. The average is ten minutes. This time can be decreased to four minutes by forcing ether vapor in the cabinet as advised by McGrath.[7] A heater under the funnel also vaporizes the ether quickly and decreases both the amount of ether and the time necessary to produce relaxation. As soon as the animal is completely relaxed, it is placed on the operating table and intubated, and the ether can connected.

Intubation in the dog is simple, provided three necessary conditions are fully maintained. *First,* the animal must be anesthetized to full surgical anesthesia. *Second,* the body must be perfectly straight and the animal on its back. *Third,* the tongue must be pulled forward in a perfectly straight line. The latter procedure throws the glottis in full view and a metal tube can be inserted into the trachea. With this method of auto-inhalation, the diameter of the metal tube should be such that it almost completely fills the trachea. It should be inserted down to the bifurcation and then retracted 3 or 4 cm. The time necessary for intubation and attaching the ether can is seldom more than one or two minutes.

The ether can may be simple, or complex, as desired. On the whole I have found the simplest kind to be the best. The one generally used by us is made from an ether container in which two small straight metal tubes have been soldered in the top. To one of these is attached a T tube connected by rubber tubing to the intubation tube. A small valve in the T tube allows the entrance of air which does not contain ether vapor. A small piece of paper is pasted to the other opening in the can; this acts as an indicator of the rate of respiration. The animal breathes the air over the ether which contains a relatively high ether tension. The anesthesia when once regulated, can be maintained for an hour or more without any further attention of the anesthetist.

There are several other ether containers which may be used. For example one described by Guthrie, made of a mason glass jar; the one devised by Jackson,[5] and the container in the insufflation machine of Adson and Little. In all of these, one-way valves may be included.

ADVANTAGES AND DISADVANTAGES OF THE CLOSED CABINET METHOD OF ETHER INDUCTION.

The closed cabinet method of anesthesia has many advantages and some disadvantages. By starting the anesthesia in an etherizing cabinet the animal goes under slowly with just enough anesthetic tension to produce anesthesia, thus making the initial administration, which is ordinarily the most dangerous part of the procedure, relatively safe. The animals rarely become over-etherized in the ether cabinet. Furthermore, the average animal passes into a state of anesthesia with the minimum amount of struggling and without relaxation of the bladder or anal sphincters. Since the cabinet is airtight and large, there is a limited amount of rebreathing during the period of initial etherization, when rebreathing is probably of the greatest value. The procedure requires only one anesthetist, who may render other assistance while the animal is slowly reaching the anesthetized state.

The two possible disadvantages in this method of etherization are *first,* that it requires more ether than the old-fashioned cone method, and *second,* a somewhat longer time for the animal to become anesthetized. The latter disadvantage need be of no consequence in loss of time, however, since the anesthetist may be occupied with other work.

The simple ether-can method requires a slightly larger amount of ether than some of the other methods, as the animal, in breathing back over the ether surface, blows out the same proportional amount of ether as is drawn into the respiratory passage. This can be obviated by the use of two one-way valves. In our experience, however, the additional respiratory effort necessary to operate these valves and the increasing complexity of the apparatus, have seemingly more than offset the advantages of their use and the saving of ether, although in the hands of a well-trained anesthetist they may be satisfactorily manipulated.

In general, the advantages of the cabinet inhalation method are many: An even anesthesia may be maintained; the anesthetist after starting the anesthetic can devote most of his time to other duties, and the animal is very easily kept under light anesthesia from which it comes out quickly after the operative procedure has been carried out. In our laboratory it is always planned to have the animal completely out of the anesthesia within one hour after completion of the operation.

METHODS OF ANESTHESIA FOR VARIOUS SPECIES OF ANIMALS.

Although the last described method of anesthesia is of the greatest value in the dog, we have been able to adapt it to some of the other species, such as the goat, cat, and rabbit. Most of the other species, either because of their small size or their reaction to the anesthetic, demand more attention. I know of no better manner of etherizing the guinea pig and the rabbit than by the old-fashioned cone method in which the cone is made from a small towel. This also works very well with the cat following a preliminary etherization in a bell-jar or some other small container .

The goat is one of the most difficult animals to anesthetize. Preliminary drug medication is pre-eminently useful in this species. The dosage, however, must be large. One-fourth grain of morphin and one-fiftieth grain of atropin should be administered to the average animal. Even these do not wholly stop the flow of mucus, and there is danger that the animals will choke to death. In a few experiments in which the saliva and mucus secreted by the goat were measured, they were found to total more than one liter each hour. If the animal's head is not in a position to allow the flow to drain, the animal will drown in his own secretion. Intubation and the use of the Connell anesthetometer is the best method of etherizing the goats. Intubation is not so difficult as it would seem; it must be done by touch, however, as it is impossible to obtain an exposure of the opening into the larynx.

All other species which we have attempted to adapt to laboratory work, such as the hog, and the sheep, have been relatively easily anesthetized by the cone method.

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ACCIDENTS DURING ANESTHESIA.*

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SIOUX CITY, IOWA.

Unfortunately, instruction in the art of anesthesia has been so neglected in the past that most persons who attempt it as a specialty have been under the necessity of acting, to a large extent, as their own teachers. Portions of the literature of anesthesia that have been found most instructive to me have been the *very* occasional case reports of accidents occurring during administration. It is my purpose then today to report to you five fatal accidents, during a practice of the specialty covering eight years, with their lessons. At some future date I shall beg the privilege of reporting a series of non-fatal accidents of a serious nature occurring during the same period. If in so doing, a repetition of my errors, by some one else, may be prevented I shall deem myself well repaid.

LACK OF PROPER MORTALITY STATISTICS.

I had hoped to present you with really scientific statistics as an introduction but such data I find more than difficult to obtain. A scattering few reports of 35,000 and 50,000 administrations without a death, and mention in some text books that the death rate from chloroform is 1 in 3,000, ether 1 in 10,000 and nitrous oxid-oxygen 1 in 100,000 is the best obtainable. The Military Medical reports for the past three years are not yet available, I am sorry to say.

Several years ago Dr. M. Salzer, of Cincinnati, collected Coroner's and hospital statistics on anesthetic mortality within a radius of 200 miles. From those that would supply data it was found that deaths under anesthesia averaged between one in four to six hundred administrations. More recently Dr. Stewart, of the same city, has compiled statistics of 10,700 operations, for removal of tonsils and adenoids, in the same territory, and found that 20 deaths had occurred in the series, or one death in less than six hundred administrations.

Sir A. L. Fleming, speaking to the Section on Anesthetics of the Royal Society of Medicine in London, reports 700 deaths occurring during or immediately following anesthesia, in three years, but his data again was gleaned from Coroner's reports in the daily papers, for want of better material. I quote from his report a paragraph with which I most heartily agree.

"It seems a great pity that we cannot devise some method by means of which we might obtain full and accurate account of all instances where an anesthetic kills, helps to kill, or threatens to kill. One naturally wonders whether this Section could not do something in the direction of inducing anesthetists to report their difficult cases so that we might have the advantage of their experience. As an illustration of the incompleteness of many of the reports, we find that in only 542 of the 700 cases included in the review is mention made of the nature of the anesthetic employed. The first point which attracts our attention is the number of fatalities occurring, with melancholy regularly in different parts of the country (England)."

THE EXPERT AND THE GREATER PERCENTAGE OF HAZARDOUS RISKS.

The routine administration of anesthesia over a goodly portion of the United States today is done by internes, nurses and office assistants which forces, to a large extent, the occasional doubtful case to the door of the specialist in this line. His percentage of poor results may therefore be great. But is that an excuse for his not reporting his misfortunes if for no other purpose than that of their instructive value?

During the eight years of my experience, administrations have totaled approximately 7,200. This includes some eight or nine hundred administrations during hospital interneships. *The 5,000 administrations during the last five years have included a goodly number of cases referred to me because doubt was probably present as to the advisability of using the routine anesthetist ordinarily employed.* Nearly all during the last five years included the use of oxygen with nitrous oxid or ether or both.

CASE REPORTS.

CASE I. (March, 1914). A boy eight years old under osteopathic treatment for general peritonitis during the previous three weeks. Abdomen tense with pus and patient in extremis. Nitrous oxid was administered with a small percentage of oxygen and incision made. The pus shot into the air and he was dead. The whole procedure was over too quickly to make observations. *The case is almost devoid of teaching value except that the possibility of saturating this child with oxygen first and gradually introducing small percentages of either nitrous oxid or ether might have bettered the result.*

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*Read before the American Association of Anesthetists, during the Eighth Annual Meeting, Hotel Grunewald, New Orleans, April 26-27, 1920.

Case 2. (May, 1916). Mrs. C. Age 61, weight 250 lbs, deeply jaundiced and septic. Diagnosis, stone in the common duct of the bile tract. Delay and administration of sedative drugs before administering nitrous oxid and oxygen was advised against by the internist consultant as also was suggestion of ether as a possible choice. Nitrous oxid and oxygen induction was then attempted, using a small percentage of oxygen. At the beginning of the operation the pupils dilated, then the respiration ceased and lastly the pulse. Pure oxygen was not available immediately and under pressure enough to inflate the lungs due to the type of apparatus then in use.

Deductions:—*First*: An anesthetist must use his own judgment as to drugs and method of administration. He alone should know what drug or drugs he can the most wisely use in a given case.

Second: His judgment should include an ability and equipment to recognize a toxic myocarditis when present and a knowledge as an anesthetist that very high percentages of oxygen are required with either nitrous oxid or ether in a case of toxic myocarditis. A sphygmomanometer is essential in his equipment.

Third: He should at no time administer nitrous oxid-oxygen when pure oxygen direct to the patient's lungs is not available instantly.

Fourth: Until he is familiar with all the physical signs by which an anesthetized patient's condition is judged, namely pupil reactions, signs of the extrinsic muscles of the eyeball (Guedel) together with respiration, pulse and systolic and diastolic blood pressure observations, as well as color he will do much better to select ether rather than nitrous oxid as the agent of choice in deeply jaundiced persons and those of the dark skinned races.

Case 3. (December, 1916). Mrs. H. D. Age 31, weight, 125 lbs., sick five days, pulse over 150 and arythmic three days previous. Diagnosis, pus tube ruptured or ruptured ectopic pregnancy. Patient suffering moderate air hunger for six to eight hours. Slight cardiac dilatation to right. Pulse 150, arythmic and irregular. Systolic blood pressure 118, diastolic 80. Pain in left chest radiating to center for past six to eight hours. It was later learned that a diagnosis of myocarditis had been made and ice bags ordered for chest three days previously by another physician and refused, as was operation at that time. Morphin sulphate gr. 1/8 and scopolamin gr. 1/150 were administered hypodermically and one-half hour later nitrous oxid-oxygen induction was begun, again with a small percentage of oxygen. Pupils dilated during first few breaths. Respiration stopped almost with dilatation and pulse last. Pure oxygen under pressure was not immediately available.

Deduction—*First*: Weight was here placed on a nearly normal blood pressure reading without due concern for the other factors involved. A normal pulse pressure with a very rapid heart rate leaves no reserve of a possible increased rate when needed.

Second: As in Case 2 scant oxygen was administered in a case of toxic myocarditis when a large excess of oxygen was needed by the patient. Ether instead of nitrous oxid might have been wisely added to the oxygen.

Third: Again pure oxygen was not instantly available with which to inflate the lungs when normal respiration ceased.

Case 4. (November, 1917). Baby, one year and ten months of age. Blue baby at birth, otherwise normal. No heart lesion demonstrable. Diagnosis, Naevus of the scalp. Anesthesia induced with nitrous oxid and oxygen and continued with ether and pure oxygen, using an adult mask and slightly negative pressure, requiring slight inspiratory effort to maintain flow of oxygen through ether. During fifteen minutes consumed by the operation, the pupils were normal but pulse gradually decreased in rate. At this time ether was shut off and pure oxygen continued, pulse rate still decreasing. Voluntary respiration stopped twenty-five minutes after anesthesia began and was continued artificially with pure oxygen under pressure. Heart stopped thirty-five minutes after anesthesia began.

Deductions—*First*: The most likely explanation of anesthetic death in a child, over-dose of the drug, would seem to be ruled out by the contracted pupils. However, we know that a child's pupils often fail to contract after the second stage of anesthesia and remain dilated while in apparent perfect surgical anesthesia. Conversely, they possibly may fail to dilate when entering the fourth stage.

Second: Probably this baby was asked to make some effort at inspiration in order to keep up the flow of oxygen. Could this have been a factor? My present habit is to use some excess pressure, that the inhalation may be free, when anesthetizing children with an apparatus of this sort.

Third: An adult mask with outlet valve in the top was used which may have been too large for the tidal air of the child patient, thus causing it to accumulate an extreme excess of carbon dioxid and not getting the fresh mixture at all. This case comes nearer convincing me that death can occur from the administration of an anesthetic *per se*, without the added factor of poor technic, than any other with which I am familiar. I am at a loss to explain the accident satisfactorily.

CASE 5. (November, 1918). J. R. Age 37, weight 145 lbs. Healthy male. Operation preparation of dental cavities. Patient extremely apprehensive and worried because of cavity preparations extending over previous days and refused to continue work without anesthesia.

Nitrous oxid and oxygen anesthesia was induced with ease; pulse, reflexes and color remaining excellent during fifteen minutes. More than ten per cent. oxygen was mixed with the nitrous oxid. The position used was a semi-reclining one in the chair. With the advent of signs of vomiting nitrous oxid was increased but vomiting occurred. Position of the chair was quickly changed to one in which the trunk is past a right angle with the thighs, and head forward, the color becoming increasingly cyanotic during this time and the pupils dilated. Respiratory efforts using accessory muscles of respiration were noticeable at this time. Semi-solid vomitus presented from the mouth. A finger in the mouth removed more stomach contents; the throat felt clear. However, attempt at inflation of lungs with pure oxygen through a face mask failed; another exploration of throat with curved forceps and finger removed a particle of meat from the glottis of a size to perfectly fit that cavity. Further inflation of lungs with pure oxygen was easy. The pulse at this time was rapid and weak. Artificial respiration with oxygen was continued over an hour without effect except that the cyanosis was replaced by pallor. This patient had eaten his noon-day lunch three and a half hours previous to the induction of anesthesia.

Autopsy showed a normal heart and other organs but lungs more or less completely contaminated by semi-liquid vomitus both in the bronchi and smaller divisions to the alveoli.

DEDUCTIONS—*First*: An individual, when under mental stress may have his digestive processes slowed to a considerable extent. I have since seen a patient with normal digestion who retained food eaten twenty-four hours previous to operation.

Second: The semi-reclining position, ordinarily desired for dental work, is a dangerous one in which to administer anesthesia. The possibility of inhaled vomitus and respiratory obstruction is a real danger. Safe positions during anesthesia are necessary even at the inconvenience of the operator.

CONCLUSIONS.

A. F. Stotts of Galesburg, Ill., speaking before the American Association of Railway Surgeons, October, 1911, said: "*The three most important factors concerned in anesthetic mortality rate, in their order of importance, would seem to be the anesthetist, the patient and the anesthetic agent; and we might also say that these same three factors in their order of enumeration are the most properly concerned in the safety of any anesthetic administration. By far the most important essential in the safety of the anesthetic is that it be administered by an expert.*" I think he is right.

I believe that the witnessing of these accidents has helped me to avoid similar ones since; and I hope by that much have I gained in my struggle to become an expert in the art of anesthesia. If, by reporting them in such detail as was possible, anyone can be helped along the road which I am traveling I shall be very happy. The time is approaching when more adequate instruction may be had in the science of anesthesia. In the meantime reports of our failures and accidents I believe worth while.

In conclusion an anesthetist must *first* be able to estimate himself, the strong and the weak points of his ability. He must not attempt the impossible. He must have the initiative to use his own judgment in preference to that of a specialist in another field.

Second, he must be able to estimate his patient, to recognize myocarditis and a weakened circulatory system and treat it as it deserves.

Third, he must have at his command a series or combination of drugs with which he is thoroughly familiar together with proper apparatus for getting them to his patient at the right time. This will include (a) a knowledge of the value of oxygen when added to all inhalation anesthetic agents and the mechanical means to properly administer it in proper dose at the proper time; (b) a knowledge that it is poor judgment to hurry nitrous oxid-oxygen induction at any time and especially so in a case of weakened circulatory muscle. Let him remember that such a patient has a tendency to dyspnoea in bed and will be comforted by pure oxygen and anesthetized while still taking high percentages of that gas; (3) a knowledge of the folly of attempting muscular relaxation with nitrous oxid and oxygen alone without preoperative administrations of sedative and relaxing drugs or the addition of ether to his mixture; (d) and lastly, it will include a careful attention to preoperative preparation and position of his patient during operation if these factors are to add or subtract from the patient's risk.

525 Frances Building.

ANESTHESIA IN WAR SURGERY

A MIXTURE OF ETHYL CHLORID, CHLOROFORM AND ETHER FOR GENERAL ANESTHESIA—AN EXPERIENCE IN WAR SURGERY.*

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The use of ethyl chlorid as a general anesthetic is given but four scant pages in a recent volume written by Flagg on "The Art of Anesthesia." He describes briefly the tecnic for giving ethyl chlorid as a sole agent for the induction and maintenance of general anesthesia, but it is evident that the main object of his description is to discourage its use because of its dangerous properties. He barely mentions certain "admirable properties as an adjuvant to chloroform and ether."

Having had no experience with ethyl chlorid alone for general anesthesia, the writer can not discuss that feature. However, it was his fortune to be stationed at an Evacuation Hospital (No. 114) in the Argonne during the last month of the war and to have occasion to employ at this hospital, for general anesthesia, ethyl chlorid in combination with chloroform and ether in a considerable number of cases.

The observations that were made in the use of this mixture, in the type of surgery which confronted the medical officer at the time, were very favorable. *It was uniformly declared to be the most suitable anesthetic for all minor injuries as well as for wounds of medium severity. It was adopted at this hospital as the anesthetic of choice for practically all operations which could be completed within 15 to 20 minutes. The speed of the operating team was therefore, in many instances, the criterion as to whether the choice should be the ethyl chlorid mixture, or simply ether.*

DRAWBACKS OF OTHER ANESTHETICS IN WAR SURGERY.

Nitrous oxid anesthesia was not practical for at least three reasons. Nitrous oxid gas was not readily obtainable; the apparatuses were usually out of repair; and a sufficient number of skilled anesthetists were not available.

The usefulness of the ethyl chlorid mixture in war surgery was demonstrated by French surgeons in 1916. The use of this form of anesthetic was by no means universal in the French Army, but a certain number of their leading surgeons had become familiar with the method and employed it throughout the last year of the war. It was introduced into a few American hospitals near the end of the war. So far as the writer has been able to ascertain, it was given a more extensive trial at our Evacuation Hospital than at any other American hospital. It was adopted for the cases already indicated at the request of Commanding Officer, Lt.-Col. J. C. McCoy, who had acquired the technic from the French.

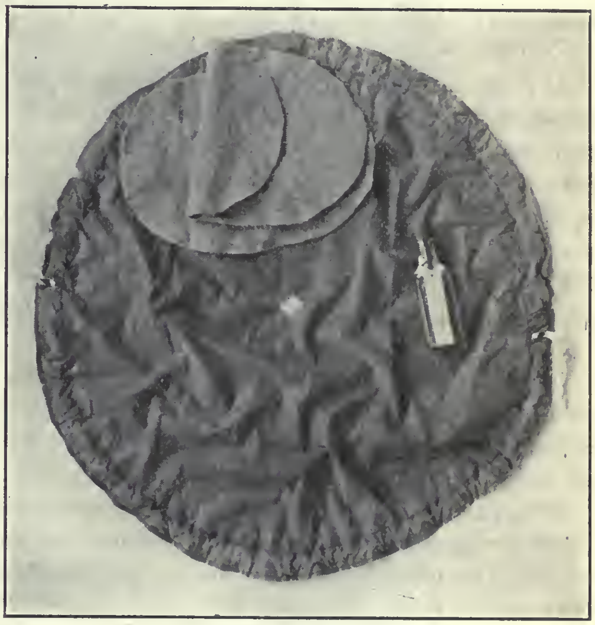

Fig. 1—The Mask and the Bottle of the Mixture.

Although ether was used by the majority of the American surgical teams near the front, it was evident to all that it had several serious drawbacks, namely:

1. The time necessary to put the patient to sleep was often a total waste so far as the rest of the operating team was concerned. A quicker anesthetic would have enabled many surgeons to handle

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*Read before the Western Surgical Association, at Kansas City, Mo., December 19, 1919. Authorized by the Surgeon General of the Army.

at least twice as many cases as they did in a given time. This was exceedingly important in view of the necessity of early prophylactic excision of the wounds before infection could become established in the tissues.

2. Many wounded came to the operation soon after eating. Ether anesthesia would usually not be effective in such cases until the stomach had been evacuated by repeated emesis with its attendant danger of aspiration.

3. Many wounded were suffering from colds, tonsilitis, pharyngitis, laryngitis and bronchitis. It seemed doubly unfortunate to be obliged to administer ether to all such patients, especially as "the flu" infection was present at the time.

4. After a deep ether anesthesia, even of short duration, the patient required to be left in the hospital bed for a sufficient length of time to overcome the effect of the anesthetic. This was of importance to the incoming wounded who sometimes had to remain on the litters until those already operated could be evacuated from the hospital.

VARIOUS E-C-E MIXTURES AND METHOD OF ADMINISTRATION.

It was in respect to these objections that ethyl chlorid in combination with certain amounts of chloroform and ether, was found to have decided advantages over ether alone.

Different French surgeons employed slightly different proportions of ethyl chlorid, chloroform and ether. The mixture used by the writer was that recommended by M. Savariaud. It consists of ethyl chlorid 5 c.c.; chloroform 1 c.c. and ether 24 c.c., making a total of 30 c.c. for each anesthesia. It was given by the closed method of administration in a rubberized bag. M. Savariaud devised a mask for this purpose and Pellot and other surgeons made improvements on it to suit their fancies. We were unable to obtain any of these masks and were, therefore, obliged to improvise them out of materials at hand.

Our method of preparation and administration of the anesthetic was as follows:

A piece of very thin but strong rubberized linen is trimmed into an oblong or circular shape 55 c.m. long and 65 c.m. wide. This is hemmed or faced around the margin so as to permit the introduction of a puckering string by means of which the oblong material can be drawn into a bag, *i.e.,* into a mask to fit over the face. A hole is cut in the center of the cloth about 2 c.m. square. Two oblong pieces of cotton flannel are prepared, each large enough to cover the patient's face. The mixture is then prepared in an ordinary one ounce medicine bottle. A strip of adhesive plaster is fastened to the bottle and on it is marked the 5 c.c., 6 c.c. and 30 c.c. levels. Ethyl chlorid is put into the bottle from a tube up to the 5 c.c. mark, 1 c.c. chloroform is added, lastly ether is poured in up to the 30 c.c. mark and the liquid is thoroughly mixed.

METHOD OF ADMINISTRATION.

1. One of the two pieces of cotton flannel is laid dry over the patient's face and the other piece is placed in a cup or small pus basin.

2. The whole contents of the bottle is poured into the cup over the piece of flannel, which absorbs practically all the 30 c.c. mixture.

3. The piece of flannel is then rapidly picked up before evaporation takes place and spread out smoothly over the other piece on the patient's face. The patient must be told to hold his breath before the saturated cloth is approximated to the face and until the mask is properly adjusted.

4. The mask is placed over the face and the puckering string drawn tightly and tied so that the margin of the mask is held firmly around the face, under the chin, in front of the ears and over the top of the head. It is desirable that the mask be applied air-tight to the face, though practically this may be impossible, especially over the hairy part of the head.

As soon as the mask is applied the patient is directed to take short breaths. This will cause him to lose consciousness quickly from the ethyl chlorid vapor as being the most volatile of the drugs used. If he should give evidence of struggling with his respiration when he fills his lungs more completely a few moments later, he will, as a rule, have forgotten it when the operation is over. The jaw muscles will occasionally become firmly set and may interfere somewhat with respiration, at the beginning of the anesthesia and until the patient is fully asleep. To overcome this interference, some anesthetists adopted the method of placing a cork, securely fastened by a string, between the patient's teeth before the mask is applied.

Unconsciousness comes very rapidly. After six to ten deep inspirations the incision can be made. The closed mask causes a continuous re-breathing and the respiratory center shows a distinct stimulation throughout the time of anesthesia. The inflow of air through the small opening in the center of the mask may be regulated by the anesthetist's fingers.

The anesthesia from the dose given lasted from twelve to twenty minutes in the average wounded doughboy. In the experience of the writer, if a certain surgical procedure could not be completed during this sleep, ether was added through the opening in the mask until the operation was finished. The French surgeons referred to did not hesitate to give a second dose of the same mixture when required. After the removal of the mask, the patient would wake up in a few moments. In the cases where the location and severity of the wound did not form a contra-indication, the patient would walk out of the operating room after five or ten minutes' rest on the table or on a chair.

REACTIONS OF PATIENTS.

The anesthesia was highly satisfactory in the kind of work in which we were engaged. The fact that the patient was ready for incision within one minute after the application of the anesthetic, made it possible for the surgeon to work practically without intermission. After the completion of one operation, the anesthetist stepped to the next table where another patient was already waiting to be anesthetized. By the time the surgeon and his assistant had changed gloves, the anesthetist had prepared the mixture and was ready to apply the mask.

The patient would not always be completely relaxed. There would be, in some cases, slight involuntary muscular movements or quivering, throughout the operation, but not enough to interfere seriously with the work. These spasmodic movements when present would be as marked in other parts of the body as in the part operated on, which tended to show that they were not due to painful impressions from the site of the trauma, but rather to the stimulating influence of the anesthetic. In some patients a short period of excitement was present after the first inspiration, and

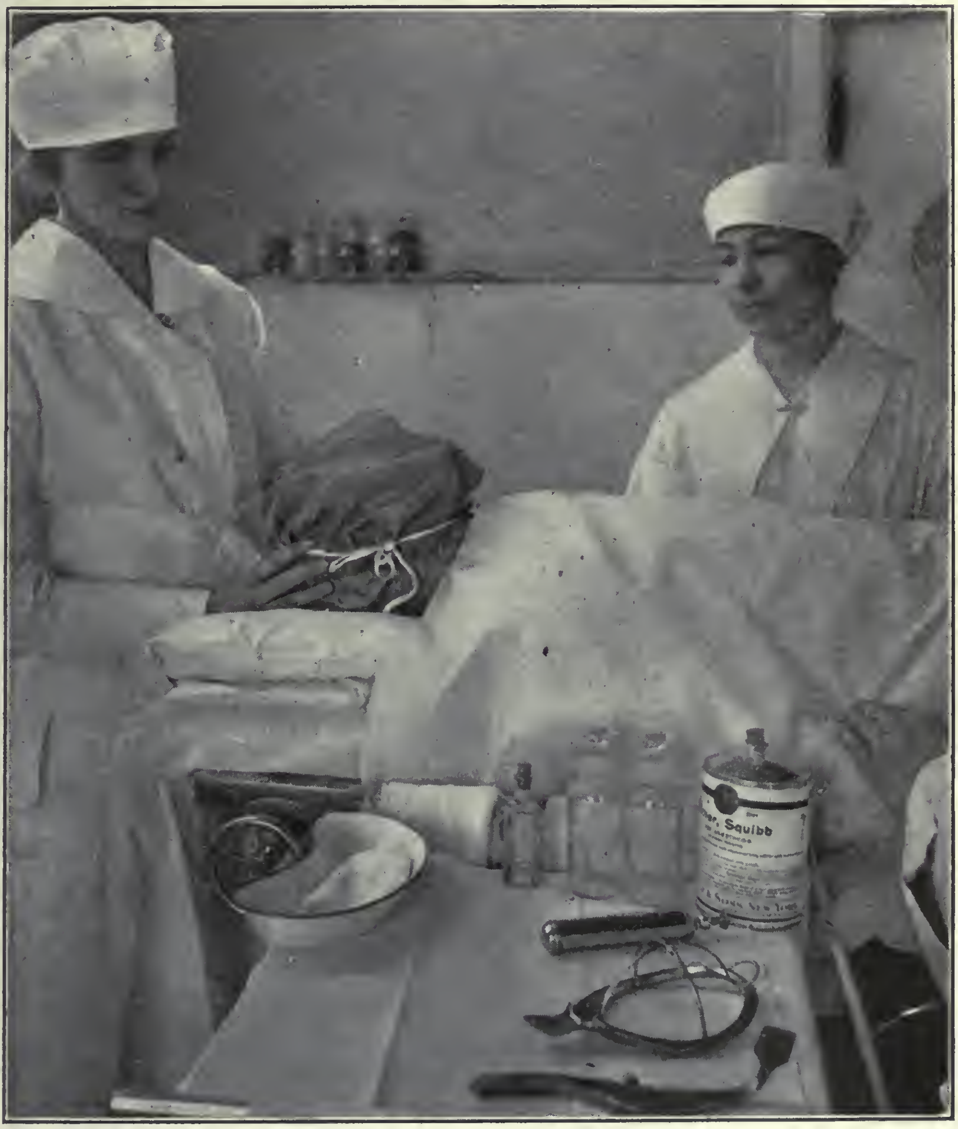

Fig. 2—The Mask Applied to the Patient.

with others there would be a few minutes' exhilaration after the mask was removed.

There was practically no stimulation of mucus in the throat, a very desirable condition in those suffering from laryngal or bronchial infection, and the proportion of these was very high. Nausea was evident in only a few and emesis took place while the patient was waking up in the few cases where it was present at all. Most patients who had walked to the operating table could and did walk away from it after a ten or fifteen minutes' operation.

RESULTS.

We had no death from the anesthetic, no syncope, no alarming cyanosis and no serious difficulty with respiration. Being in an evacuation hospital, it was, of course, not possible to observe the patients more than a few hours after operation, but from such information as could be obtained, the after-results were satisfactory.

There were 400 patients operated in all under this anesthesia, the majority of these being performed by the writer. The nature of the operations ranged from small excisions of superficial wounds to the removal of extensive lacerations, including amputations of arms and legs. Intra-cranial, intra-thoracic and intra-abdominal injuries were not treated under this form of anesthesia. Wounds on the face would, of course, exclude the use of this method.

There can be no reason why this ethyl chlorid mixture should not be used in emergency surgery in civil practice when conditions and necessities correspond more or less to those of the wounded soldiers. The lessons learned from acute war surgery which are of practical importance for civil practice are not many when we consider the great amount of surgery done at or near the front. The use of ethyl chlorid as indicated above, is, in the opinion of the writer, one of these lessons.

IN BEHALF OF THE ADVANCEMENT OF YOUR SPECIALTY YOU ARE REQUESTED TO READ A PAPER ON SOME PHASE OF ANESTHESIA BEFORE YOUR LOCAL, COUNTY OR STATE ASSOCIATION. IT IS ALSO UP TO YOU TO PREPARE YOURSELF TO TEACH ANESTHESIA IN YOUR MEDICAL SCHOOL AND TO INSTRUCT INTERNS IN THE HOSPITALS IN WHICH YOU WORK. THE AMERICAN ANESTHETISTS ARE MAKING AN EFFORT TO SECURE A SECTION ON ANESTHESIA IN THE AMERICAN MEDICAL ASSOCIATION. USE YOUR INFLUENCE AS WELL AS THAT OF YOUR FRIENDS TO GET YOUR STATE SOCIETY BEHIND THIS VITAL AND NECESSARY MOVEMENT TO INCREASE THE SAFETY OF ANESTHESIA, TO HAVE IT MEET THE PROGRESS IN SURGERY AND THE EXTENDED DEMANDS OF HOSPITAL SERVICE.

A MODIFICATION OF THE OPEN ETHER METHOD.

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The particular requirements of war surgery have given a great impetus to the use of ether as a general anesthetic for routine work, and especially to its administration by the open method. The preference shown for this method is, perhaps, largely because, on paper at any rate, it seems to be so simple and so devoid of difficulty and danger. Omitting the question of safety, it will be found in practice, especially by the beginner, or if the attempt be made to use ether alone from start to finish, that the method is not so simple and easy as might at first sight appear.

DIFFICULTIES OF OPEN ETHER ALONE.

In the course of the last three and a half years or more, as I reported in the British *Medical Journal,* May 24, 1919, I must have paid close upon 1,000 visits to different war hospitals throughout the country, and so have enjoyed exceptional opportunities of watching the work and obtaining the views of other anesthetists. From this experience I gather that the chief practical difficulties which present themselves when the attempt is made to use ether alone from the beginning are:

1. The period of induction is much prolonged. As much as twenty minutes has frequently been reported to me, and in some cases I have been informed that it had been absolutely impossible to get the patient under at all,

2. Nearly all patients object to the taste and smell of *straight* ether, and in those of the over-robust type and in the alcoholic this objection is frequently the prelude to respiratory spasm, lividity, and troublesome struggling.

3. In the same type of patient, too, complete muscular relaxation appears to be difficult or impossible of attainment.

4. The amount of ether used is often excessive. From 12 to 16 oz. an hour is no uncommon record, and I have known it to be even more. This, of course, is a trouble which makes itself felt by every occupant of the operating theatre.

5. The flow of mucus and saliva may be excessive and when this is the case the patient is very apt to develop an undue amount of postoperative bronchial irritation.

UNTOWARD EFFECTS OF INDUCTION WITH CHLOROFORM OR STRONG C-E MIXTURES.

Continuous practice will, of course, go a long way towards mitigating these troubles. The prior injection of morphin and atropin, especially the latter in tolerably large doses, is also a great help, particularly with regard to the excessive salivation and tendency to bronchial irritation.

Usually, however, the anesthetist seeks to overcome the difficulties by starting with a little chloroform or *mixture* (equal parts of chloroform and ether, or 1 of choroform to 2 of ether, or 2 to 3). This is generally administered upon the same mask as prepared for the ether alone—that is, twelve to sixteen layers of gauze with an underlying face-pad, and the patient is carried to the stage of complete anesthesia, and the pure ether is substituted as soon as it is thought that he will no longer resent the change. *In many, perhaps in the majority of instances, this plan succeeds well enough for all practical purposes, but in rather a large number of cases a tendency to respiratory cardiac failure develops in the course of two or three minutes after the change to pure ether has been made. I believe myself, too, that in some cases deaths have resulted in this way.*

To explain these untoward results, it has been suggested that the face-pad and thickish layer of gauze or lint used in the open ether process do not permit of a sufficient dilution of the vapor with air, as is so essential for the safe administration of chloroform, and that when the gauze is wetted, particularly with the heavy, semi-viscid chloroform liquid, an almost impervious or closed system is formed, with momentary accumulations of dense chloroform vapor immediately above the mouth. At any rate, it is quite clear that if chloroform or one of the strong mixtures be used for induction, the face-pad should be discarded, an entirely separate and much thinner mask employed, and the patient must be most carefully watched for the faintest indication of respiratory or other failure. Slight as these changes really are, they suffice to rob the open ether process of its simplicity, and therefore are seldom adopted.

MODIFIED OPEN ETHER.

Looking about for a means to overcome these difficulties, my attention was attracted by Dr. McCardie's excellent paper on "A Method of Anesthetizing Soldiers," which appeared in the *British Medical Journal* of April 21st, 1917, in which he advocated the use, in a Clover's inhaler, of a mixture of 1 part of chloroform to 16 of ether. I proposed, thereore, to use this combination of 1 to 16 in lieu of the stronger mixtures alluded to above. Before doing so, however, I took the opportunity when in Birmingham to discuss the subject with Dr. McCardie. He expressed his doubts about my proposal, and said that he thought the same objections would apply to his 1 in 16 mixtures as to the stronger ones. However, I gave the combination a trial, and, although it succeeded admirably in many cases, it obviously required careful watching, and in some few instances I received rather adverse reports about it.

I then experimented with various combinations of the two drugs, and have finally settled upon a mixture of the following proportions:

Chloroform	1 drachm
Ether	32 drachms (4 oz.)

This, it will be seen, is approximately 3 per cent. of chloroform in ether, or a very little stronger (3 in 99).

In using this attenuated mixture I have found that the following are the chief points to be attended to. Although not essential, it is of advantage that the patient should have a preliminary injection of morphin (1/6 grain to ¼ grain) and atropin (1/100 grain to 1/60 grain). The face-pad and mask is the same as for open ether, the mask being closely applied to the face and face-pad from the very beginning. The liquid is used exactly as if it consisted of ether alone, the presence of the small quantity of chloroform being ignored. During induction the liquid is poured freely on to the mask just to the verge of resentment, but when consciousness and reflexes are abolished, it will suffice to reduce the supply to the dropping stage. If at any time during the course of the operation it be thought that the anesthesia is not sufficiently deep, there need be no hesitation about increasing the amount. Needless to say, the same care in watching and maintaining the breathing are required in this as in any other method of anesthetization; the plan makes no pretence to be absolutely fool-proof.

ADVANTAGES.

In my own hands and in the hands of many others who have tried it, the combination used in the way indicated has given excellent results. The advantages that I would claim for it are:

1. *Simplicity.*—There is no need to change the drop bottle or mask, or to remove the face-pad which are the same as for the original open ether method.

2. *Rapidity.*—As the result of many careful time tests I have found that the patient is well able to be moved in about five minutes, and that the first incision may be made in another minute or so. At the outside, ten minutes should complete the whole process. This is a very great gain as compared with a possible twenty minutes—a gain both to the patient and the temper of the surgeon.

3. *Lack of Irritation.*—It is really quite remarkable how the addition of such a small quantity of chloroform should go so far in the direction of converting the pungent ether into a comparatively bland vapour. The consequence is that the patient has much less objection to the inhalation than when pure ether is used; there is also less respiratory spasm, less lividity, and the struggling is practically limited to the simple movements of the stage of excitement.

4. *Efficiency.*—This, of course, is a point upon which longer experience is desirable, but so far I have never had any difficulty in obtaining a sufficient degree of relaxation to satisfy the requirements of any of the surgeons with whom I have worked, and the depth of anesthesia can be very readily regulated.

5. *Economy.*—The greatest expenditure of the liquid is naturally during the induction stage, but that seldom exceeds a couple of ounces, and I have estimated that for the maintenance of anesthesia subsequently from 4 to 6 oz. per hour is ample. This is a very great saving and comfort to all concerned.

6. *Safety.*—Neither this nor any other anesthetic can claim to be absolutely safe, nor can it be said that care and attention on the part of the administrator are less valuable assets than with any other drug or combination. On the face of it, however, I think that it is obvious that the possibilities of over dosage with chloroform are much diminished when the half-drachm required for induction is diluted in two ounces of ether, given in ten rather than in two minutes, and that a drachm to a drachm and a half used in the course of an hour is but little likely to do much harm.

The flow of mucus and saliva and the subsequent tendency to respiratory irritation are much diminished, but I do not claim that this is to be wholly placed to the credit of the mixture, but rather to the routine use of full doses of atropin which I have always advised. I should point out, however, that on account of its relative rapidity of action the 3 per cent. mixture will be found useful to those who adopt the open ethyl chlorid-ether sequence. In fact, I have myself made a few quite satisfactory experiments in the direction of using liquid ethyl chlorid in lieu of chloroform, but I have not followed up this line of work, although I believe that it may be worth while doing so. One of the objects of this communication is to establish the principle of what I would call *attenuated mixtures*, and to endeavor to show that *straight* chloroform or strong mixtures are by no means essential as an induction to open ether, but that, on the contrary, they introduce unnecessary risks in the open ether method.

16 NOTTINGHAM PLACE, W.

ANESTHETICS IN A BRITISH HOSPITAL WITH THE SERBIAN ARMY.

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This series of anesthetics, originally reported in the *British Medical Journal*, May 31, 1919, was commenced in August, 1916, and continued until January, 1918. All the operations took place under canvas in the heart of a country with a subtropical climate. The nationality of the subjects treated was mainly Serbian. The Serbian soldiers were very fit and strong men between the ages of 18 and 50, most of whom had faced the hardship of war, not only during the present struggle, but in the previous Balkan campaigns and practically all had led an outdoor life. The outstanding features from an anesthetist's point of view were their good physic, the sound state of their teeth and the absence of dentures; a large percentage did not smoke at all, and those that did were almost cigarette smokers. *A noticeable feature in the early stages was the fear of an anesthetic. Special account had to be taken of endemic disease (malaria), and occasionally of the effects of dysentery and scurvy in their relation to cardiac complications.*

In the first series many of the wounded were in a state of exhaustion on admission, owing to difficulties of transport. Where possible, these cases were allowed to rest for some hours before operation.

METHODS OF ANESTHESIA USED.

The methods of administration adopted were as follows:

1. Open administration of a mixture (ether 2 parts, chloroform 1 part), with and without previous administration of morphin.
2. McCardie's mitigated ether method with open E_2C_1 sequence (with and without previous administration of morphin and atropin).
3. Closed ether, sometimes with oxyyen.
4. Nitrous oxid.
5. Nitrous oxid-ether sequence.
6. Nitrous oxid with oxygen (improvised).
7. Chloroform (Junker's bottle).
8. Combination of methods 1, 2, 3, and 6 with local anesthesia.

Methods 1 and 2 were the most frequently employed; they were given in a series of cases, with and without previous alkaloidal administration, and the results were compared. The cases which had not had a previous injection of alkaloids were in general head cases and thoracic injuries. The administration of E_2C_1 mixture was sometimes preceded by ½ to 1 drachm of chloroform given drop by drop on a Schimmelbusch frame covered with 12-ply gauze and a layer of lint (with a small hole the size of half a crown in the centre) over all. In this method the morphin when given was in doses of 1/6 or ¼ grain one hour to one hour and a half before operation, as nearly as it could be gauged. At this stage no atropin was given.

The anesthesia obtained was as a whole very satisfactory. Induction was rather slow (about six to eight minutes on the average), *and in cases newly admitted from the trenches it was often accompanied by great excitement and struggling, whether morphin had been given or not.* The maintenance of anesthesia was as a rule even and regular; there was little vomiting, and no respiratory disturbance or salivation. *It was noted that those patients who had morphin took a little less anesthetic, and generally the induction was quieter and a little quicker. Signs of stock on the table were absent, except in a few cases where the operation had been prolonged and severe, or where hemorrhage had occurred.* The period of recovery was quiescent.

1. E_2C_1—SCHIMMELBUSCH FRAME.

The following summary shows the quantities of anesthetic used:

(*a*) With preliminary morphin: 333 operations; average length of operation 37.9 minutes; average quantity per operation 11.3 drachms; or, taking an operation of thirty minutes' duration, 8.7 drachms.

(*b*) Without preliminary morphin: 231 operations; average length of operation, 33.1 minutes; average quantity per operation 10.6 drachms; or, taking an operation of thirty minutes' duration, 9.6 drachms.

It will be noted that there is not a big difference in the quantities used in the two classes, the cause being chiefly absence of the ideal conditions for complete success with preliminary alkaloids, such as quietness of surroundings, subdued light, and smooth transport from ward tents to theatre. However, the other benefits were obtained. With regard to the quantities used as compared with open ether administration, the figures given by Silk and others are 6 to 8 ounces an hour, or even 8 to 10 ounces an hour in Malta.

2. M'CARDIE'S MITIGATED ETHER.

In this procedure a Clover apparatus is used into which 1 oz. of ether, with half a drachm of chloroform, are placed in the container, and 21 minims of E_2C_1 mixture in the bag. The facepiece is closely and firmly applied; induction is commenced by rebreathing from the bag only for forty to sixty seconds, and followed by turning on the mitigated ether. Watch is kept for cyanosis, and if this appears (which is rare), one or two breaths of air are given. Induction was almost always easy, quiet, and rapid, taking four or five minutes. Anesthesia with these quantities lasted from fourteen to twenty minutes, when, if the operation required it, open E_2C_1 followed. Those cases which had a previous alkaloidal administration were given morphin gr. ¼ and atropin gr. 1/150, half an hour before operation as nearly as possible.

The advantages gained from this method were confirmatory of those claimed by McCardie,[2] namely—

1. The respiratory irritation due to ether vapor by the closed method is much mitigated by the addition of a small quantity of chloroform.
2. The addition of chloroform in this amount distinctly saves the work of the heart and lungs in a long or severe operation.
3. The mixture is practically as safe as ether alone.
4. It is valuable as a routine method of inducing anesthesia, being safe and rapid.
5. A few drops of E_2C_1 mixture are preferable to ethyl chlorid as a preliminary to the administration of the mitigated ether.
6. For maintenance of anesthesia E_2C_1 mixture by the open method is preferable to even mitigated ether, owing to the prevalence of respiratory irritability in soldiers.

The following summary shows the total quantities of anesthetic used with and without previous alkaloids:

(*a*) With alkaloids: 214 operations; average length of operation, 30.1 minutes; average quantity used, 13.2 drachms; or, for operation of 30 minutes, 13.12 drachms.

(*b*) Without alkaloids: 100 operations; average length of operation, 29.06 minutes; average quantity used, 14.4 drachms; or, for operation of 30 minutes, 17.7 drachms (that is, including the original 1 ounce of ether and half a drachm of chloroform put into the Clover inhaler).

3. CLOSED ETHER.

This was only used in 65 cases, 26 with previous alkaloidal treatment and 39 without.

(*a*) With alkaloids: 26 operations; average length of operation, 42.03 minutes; average quantity used, 17.8 drachms; or, reduced down to an operation of 30 minutes, 12.6 drachms.

(*b*) Without alkaloids: 39 operations; average length of operation, 35.1 minutes; average quantity used, 16.1 drachms; or, reduced down to an operation of 30 minutes, 13.6 drachms.

This method was adopted in several cases of a severe type, such as high amputations, and also in slight cases. In the first it was often accompanied by oxygen and occasionally warmed by placing a little hot water in the bag, as recommended by Beresford Kingsford. I abandoned it for general use on account of various well known disadvantages, such as respiratory discomfort, salivation (particularly prevalent in Serbs), and also the objection by some patients to a closed apparatus. The addition of oxygen helped materially in lessening the amount given, and easing induction.

4. NITROUS OXID.

This was given frequently for minor operations in 111 cases, including some dental ones. The apparatus in use was of the simple ordinary variety, with an arrangement for rebreathing. It was found very efficient, especially if given by the rebreathing method with intervals of air breathing according to stage of narcosis, the aim always being to avoid any cyanosis. The use of a rubber dental prop, as Boyle suggests, is a great advantage; it aids induction and ensures easy ingress for the gas or air, especially if there is the slightest sign of nasal obstruction.

5. NITROUS OXID-ETHER SEQUENCE.

This was adopted in some forty-five cases, and gave very satisfactory results. The type of case generally chosen was the minor or short operation, and in which there had been no antecedent alkaloidal preparation. Here again the rubber dental mouth prop is advantageous.

6. NITROUS OXID WITH OXYGEN.

This was employed only twice, in an improvised fashion, owing to the lack of any suitable apparatus, such as that recommended by Captain A. S. Wilson. Rough and ready as the method was, it proved of great value in two cases of amputation of the thigh, in which the patients were very weak from chronic sepsis. In both novocain was injected at the site of amputation, and in one ¼ grain of morphin was given one and a half hours before. The operations were performed quickly, there were no signs of shock, and recovery from anesthesia was rapid and without any incident, such as vomiting.

7. CHLOROFORM.

This was only used in operations on the face and lower jaw by means of a Junker's bottle. The proportion of these cases was not large, and no special difficulties were met with. The chloroform was introduced by means of a soft rubber catheter passed five inches down the nose.

8. LOCAL ANESTHESIA.

This was frequently used alone or in conjunction with a general anesthetic in operations on the head and chest, and for amputations. It certainly aided in diminishing the amount of anesthetic used, and in limiting shock or disturbance during section of nerve trunks. In thoracic operations the method is of great value.

GENERAL REMARKS.

By the use of alkaloids liability to shock on the table is decidedly diminished, and the amount of anesthetic required is less. The period of recovery is of a more quiescent character. It is contraindicated in cranial cases, especially where mentality is impaired, and in the recently severely wounded who are already suffering from shock. Care should be taken when any heart muscle weakness exists or is suspected from such causes as malaria or chronic sepsis.

The choice of anesthetic should be based on such considerations as the following:

1. Whether the wound is of a severe character and accompanied by shock.
2. The period of time that has elapsed since its infliction.
3. Whether hemorrhage has occurred or is likely to occur.
4. Whether an acute infection is present (notably gas infections) and the operation is likely to be of the nature of an amputation.

It is in the last named cases that the greatest dangers are likely to be met, but these are considerably diminished if the patient can have some hours' rest in bed with the application of external warmth. In such cases the best results have been obtained with an induction by McCardie's method, or warmed ether, and oxygen.

In abdominal cases McCardie's method was used with advantage, followed by ordinary closed ether and oxygen, if necessary. The use of oxygen is insisted on, as it acts as a stimulant, improving the anesthesia and diminishing the amount of anesthetics used.

I am specially in agreement with Captain Geoffrey Marshall's remarks on the choice of gas and oxygen in wounds of the limbs requiring amputation, and the withholding of morphin. His recommendation of it for smaller operations as a routine method is very timely.

For the average type of case which has been in hospital a little time and for operations of expediency the best results have been obtained by Mc-

Cardie's method, and, secondly, by the open administration of E_2C_1 mixture. These have the advantage of simplicity, ease, quietness of induction, and economy.

AFTER-RESULTS.

In some cases in which hemorrhage had occurred the use of E_2C_1 mixture was followed by collapse, which caused anxiety and necessitated the administration of intravenous saline.

Vomiting did not often occur during the course of operation, but chiefly when the patient was moved, in the application of dressings or transference to a stretcher. In the wards it occurred very seldom. There were no cases of delayed chloroform poisoning.

Chest complications were very few in number—not more than four or five in all (two of bronchopneumonia of a mild type, and the rest bronchitis). All recovered.

There were no fatalities.

I have to thank the operating surgeons, Major G. P. Mills and Lieutenant John H. Watson, for their constant help and suggestions, and the other members of the unit with whom I was associated in the work.

DURING SEVERAL RECENT MEETINGS OF THE GOVERNORS OF THE NATIONAL ANESTHESIA RESEARCH SOCIETY MANY PHASES OF A CONSTRUCTIVE CAMPAIGN FOR THE ADVANCEMENT OF ANESTHESIA WERE INITIATED. A SURVEY TO DETERMINE THE STATUS OF ANESTHETIC PRACTICE, EQUIPMENT AND METHODS IN THE HOSPITALS OF THE COUNTRY IS BEING MADE. ALSO A QUESTIONNAIRE IS BEING SENT TO ALL THE MEDICAL AND DENTAL SCHOOLS AND TEACHING HOSPITALS TO DETERMINE THE STATUS OF INSTRUCTION IN ANESTHESIA. THIS QUESTIONNAIRE IS BEING ACCOMPANIED BY A COPY OF THE YEAR-BOOK AS AN EVIDENCE OF THE PURPOSES OF THE ORGANIZATION AND THE TYPE OF WORK WHICH THE RESEARCH COMMITTEE IS ATTEMPTING.

THE FIRST OF A SERIES OF MONOGRAPHS ON ANESTHESIA IN THE SPECIALTIES IS NOW UNDER WAY AND RAPIDLY REACHING COMPLETION. IT IS BEING PREPARED BY A PUBLICATION COMMITTEE OF EXPERTS, OBSTETRICIANS AND ANESTHETISTS.

THE UNIFORM ANESTHESIA CHART HAS VIRTUALLY BEEN DECIDED ON AND WILL SHORTLY BE READY FOR DISTRIBUTION. IT IS TO BE HOPED THAT A GREAT MANY ANESTHETISTS AND HOSPITALS WILL USE THIS UNIFORM ANESTHESIA CHART ROUTINELY SO THAT MANY LESSONS MAY BE LEARNED FROM THE ACCUMULATED RECORDS.

TO STIMULATE INTEREST IN RESEARCH THE N. A. R. S. WILL AWARD MONEY PRIZES FOR THE THREE BEST PAPERS ON RESEARCHES IN ANESTHESIA PRESENTED DURING THE PITTSBURGH MEETING.

STOVAIN SPINAL ANALGESIA.*

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Since the year 1908, stovain spinal analgesia has been in use in the Montreal General Hospital with such uniformly satisfactory results, that inasmuch as spinal analgesia has ceased to be an anesthetic curiosity, I desire to add a word to further its use in selected cases for the benefit of mankind.

HISTORICAL EVOLUTION.

Surgery and anesthesia owe a debt of gratitude to the chemists and experimental pharmacologists, who discovered the active principle and analgesic property of the coca plant. Cocain then became a local therapeutic agent with an action on sensory nerve ending of producing insensibility to pain, or analgesia.

Bier introduced the spinal puncture in 1898 with cocain, injecting the solution into the subarachnoid space. He obtained complete analgesia in every case, pertaining to the lower half of the body, although in one patient the analgesia extended as high as the scalp. The by-effects were most disturbing, assuming the form of marked giddiness, severe headache, syncope and vomiting. Bier thought these unpleasant symptoms to be due to the loss of cerebro-spinal fluid. So he tried rest in bed as a preventive, but no beneficial result arising, he decided to drop the procedure as too dangerous and await the discovery of a less toxic drug.

In 1891, Giesel isolated the alkaloid tropacocain, which was found to be half as toxic as cocain and less poisonous in its action on the motor cells in the anterior horns of the spinal cord. Tropacocain has since been much in use in Germany.

In Great Britain and France stovain became much in favor after 1904, when its discovery was made by Fourneau and the pharmacological action by Pouchet, adding a third drug to the list of spinal analgesia agents.

Barker was a great pioneer in England in spinal analgesia, bringing the subject prominently to the notice of the profession, as well as advancing our knowledge of its technic. Barker used a compound solution, composed of stovain 5 parts, glucose 5 parts and distilled water 90 parts, all by weight. His solution having a specific gravity of 1.023 as against that of the cerebro-spinal fluid, which is 1.007, sinks to the lowest level of the patient's spine by gravitation.

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*Read before the American Association of Anesthetists, during the Seventh Annual Meeting, Hotel Breakers Atlantic City, June 9-10, 1919.

PROPERTIES OF STOVAIN.

The properties of stovain as shown by experimentation are:

1. An analgesic action equal to cocain without concurrent vaso-constriction.
2. A cardio-tonic action.
3. A bacteriacidal action.

We prepare our own solution using stovain 5 gms., commercial glucose 5 gms., in 95 ccm. of physiological saline. This solution has a specific gravity of 1.031, a neutral reaction and is placed in glass ampoules of 2 ccm. capacity.

DOSAGE.

The dosage is regulated in accordance with the weight, age and vitality of the patient. The maximum dose of stovain is .07 gms. or 1.4 ccm. of solution and the minimum dose is .01 gms.

TECHNIC OF ADMINISTRATION.

The anesthetist washes his hands with surgical care for 5 minutes under running water, using soap and nail brush, and rinses them in alcohol. The patient's back is washed with alcohol over the sight of puncture and the iliac crests. The point of puncture is the 3rd lumbar interspace, which is readily found by noting the iliac crests, which lie at the level of the 4th lumbar spine.

A Record syringe of slightly more than 2 ccm. capacity, a spinal needle (Barker model), with stilette and cannula, ampoule and file are received in a basin in lysol-alcohol, 1 part in 12, and transferred to sterile water. The syringe, needle, stilette and canula are washed and rinsed in the water and the ampoule is broken. The canula is attached to the syringe and the ampoule emptied, and the air forced out of the syringe leaving the required amount of solution and the syringe and cannula are laid carefully across the water basin. With the stilette in the needle in the right hand the left thumb finds the 3rd lumbar interspace and a point is selected ¼ of an inch from the midline, the needle is passed in forwards and slightly upwards, until the dura is pierced with the feeling of a sudden loss of resistence. The stilette is removed and the cerebro-spinal fluid is allowed to flow. One to two drachms of fluid will escape until the cannula has been inserted and the stovain solution is gently forced into the canal.

If marked resistance to the flow is encountered the needle should be withdrawn slightly when the flow will be more free. A very important factor in insuring a successful analgesia is the position of the patient for the puncture and following the injection. The saline menstrum tends to neutralize the osmosis factor and the glucose exerts a cohesive action to counter-balance the diffusible tendency, so the high specific gravity will carry the solution to the lowest dependent area of the cord.

CONTROLLING THE EXTENSION OF ANALGESIA.

So if the operation requires only the anesthetization of the sacral roots of the cord, that is for anal and perineal operations, such as hemorrhoids, fissure in ano, ischio-rectal abscess, etc., the sitting posture is used for the injection. The patient sits on the side of the table with feet resting on a chair, head and shoulders bent forward with the arms crossed, and afterwards is turned on to his back, having his head and shoulders raised to an angle of 45 degrees from the horizontal by means of an adjustable table, back-rest or pillows.

However, if the lumbar or lower dorsal nerves are to be controlled for lower extremity or abdominal operation, the patient with the head and shoulders raised, lies in a right lateral position for a right-sided operation or vice-versa, and the injection is made in this position. The patient is immediately turned on to his back and the hips are elevated by means of bar on the table. In this way the elevation of the hips and shoulders causes the dorso-lumbar area to be most dependent and the convexity of the back can be altered by raising or lowering the hips. After one minute has elapsed, sensation is tested by means of a sharp needle and the solution is allowed to flow upwards to the limit required.

For operations below the level of the umbilicus, analgesia is checked when the ziphoid sternum is reached by quickly lowering the hips to the level of the table and the analgesia ceases to advance.

If the abdominal operation is above this level, analgesia is allowed to ascend to the level of the 4th intercostal space anteriorily.

PRECAUTIONS.

It is most important that the elevation of head and shoulders be continuously maintained from the time of injection until 6 hours have elapsed from the time the patient leaves the operating room.

Since this has been an established rule, we have noted the absence of shock, faintness, cessation of respiration, or shallow respiration or symptoms indicating depression of the vital centers in the medulla oblongata.

Care must be exercised to prevent the head and shoulders at any time from being so low as to allow the stovain to gravitate upward beyond the dorsal cord, producing complete intercostal paralysis, with diaphragmatic breathing of diminished rate and depth. The pulse and respiratory rate are uniformly unaffected, and if pallor occurs it is usually emotional, requiring reassuring words, bathing the face with cold water or administering a whiff of smelling salts.

PECULIAR ADVANTAGES.

This method of anesthetizing patients has been found to be most advantageous and is always used when possible in diabetics, advanced cardiac, pulmonary or real insufficiency and it eliminates the danger of postoperative acidosis.

Analgesia persists for a period of 45 minutes to 2 hours and stovain has been detected in the spinal fluid 24 hours after injection and traces have been found in the urine 74 hours after injection.

1363 Green Ave., West Mount.

EXPERIMENTAL STUDIES ON THE EFFECT OF ANESTHETICS IN SHOCK*

McKeen Cattell.
Boston, Mass.

The fact long known that patients in a condition of shock take anesthetics badly, was strongly brought to the attention of the surgeon during the recent war and led to an experimental study of the problem at the Surgical Research Laboratory at Dijon, France, which is now being continued in the Harvard Physiological Laboratory.

In the limited time at my disposal it is possible to give only brief summaries of the more important results, the details of which will be published later. The work has extended over a period of nearly two years and represents the results of experiments on over 150 animals.

EFFECTS OF ETHER IN SHOCK, SEVERE OPERATION, HEMORRHAGE AND ACIDOSIS.

It was found that in cats and dogs in a state of shock the blood pressure is very markedly influenced by ether, the inhalation of an amount just sufficient to cause the disappearance of the eye reflex usually resulting in a drop of pressure of over 50 mm. of Hg. The blood pressure of a normal animal in unaffected by this amount of ether, or only momentarily at the beginning of its administration. This condition of ether sensitiveness is gradually developed under any circumstances that depress the general bodily condition of the animal, especially low blood pressure. Severe operation, hemorrhage and the injection of acid into the circulation all cause a marked increase in the ether effect. Experimentally the condition was usually brought about by the reduction of the arterial pressure by compression of the heart. Holding the pressure down to 60 mm. for one hour was usually sufficient to produce this sensitiveness, which persisted after the return of the arterial pressure to its normal level.

COMPARATIVE EFFECTS OF NITROUS OXID-OXYGEN ANESTHESIA.

In this condition a comparison of the effects of nitrous oxid and oxygen and ether shows an interesting difference. Ether caused the usual marked fall in blood pressure, while nitrous oxid and oxygen given to the same depth of anesthesia may cause no fall whatever. In making these comparisons the anesthetics were usually administered in an amount just sufficient to cause a disappearance of the eye reflex, the procedure being identical in each case. With a relatively large proportion of nitrous oxid the fall may be nearly as great as with ether, but by using a concentration no stronger than necessary to produce the desired anesthesia (from 3 to 4 parts of nitrous oxid to 1 of oxygen) there is no effect on the blood pressure. This is confirmatory of a large body of clinical evidence. It is generally recognized by anesthetists that a patient in poor condition survives an operation in a much better state with nitrous oxid and oxygen than with ether or chloroform, and in the recent war every effort was made to have nitrous oxid and oxygen as widely available as possible for use on cases of shock and hemorrhage.

THE CAUSE OF INCREASED SENSITIVENESS OF BLOOD PRESSURE TO ETHER ANESTHESIA.

Experiments are now in progress regarding the cause of the increased sensitiveness of the blood pressure in shock to ether anesthesia, and a few statements may be made at this time. An examination of blood pressure records shows that even in a normal, unshocked animal the first effect of ether, in high concentration in the inspired air, is a rapid fall in the blood pressure, but this is quite temporary, the low pressure being followed by a rise to the normal level while the ether is still being administered. If continued to an extreme degree, the pressure again falls, this time to zero, resulting in the death of the animal. *In the shocked animal the effect is quite different; a similar fall in pressure occurs at the beginning but is not followed by a rise. Instead, there is a further fall which rapidly approaches zero even before the eye reflex disappears.*

An attempt has been made to determine the cause of the difference in reaction between the normal and the shocked animal by a study of the effects of ether on the heart and blood vessels. There is much evidence in the literature that the peripheral action of ether is mainly on the heart, and that the resulting depression is sufficient to account for the fall in blood pressure which may result. This is confirmed by a series of experiments carried out on cats. *Measurements of the heart volume show that from the very beginning of the administration of ether there is a loss of tone, which becomes greater as the anesthesia deepens and reaches a maximum only with the death of the animal. Studies on the isolated auricle from the turtle heart show that ether, in the concentration present in the blood under ordinary anesthesia will produce a marked decrease in the tone and extent of contraction.*

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*Read during the Eighth Annual Meeting of the American Association of Anesthetists, Hotel Grunewald, New Orleans, April 26-27, 1920. From the Department of Physiology, Harvard Medical School.

INFLUENCE OF ADRENALIN.

Early in the research it was noted that certain animals in shock, which had been resuscitated by adrenalin, after an overdose of ether, lost a large part of the sensitiveness to ether which they had previously exhibited. Further experiments established the fact that this was due to an influence of the adrenalin, probably on the heart. Fourteen cats were examined for the effect of adrenalin on the circulatory depression produced by ether. In this series large doses of adrenalin (from 0.1 to 1.0 mg.) produced either a complete disappearance of the previously existing sensitiveness to ether, or it was markedly decreased. *The fact that adrenalin reduces the effect of ether, at once suggests that it also acts through the heart in an antagonistic manner. Since there is no good evidence that the fall in blood pressure resulting from the administration of ether is caused by an effect on peripheral vessels, it is unlikely that the protecting effect of adrenalin can be ascribed to its effect on the blood vessels. Pituitrin, which is practically without influence on the heart, but which causes strong contractions of smooth muscle of the arterioles, is absolutely without effect in influencing the blood pressure fall from ether. If the fall were due to an effect on the peripheral resistance, it should become less after the administration of pituitrin.*

THE DIFFERENT EFFECTS OF ETHER ON THE CIRCULATORY SYSTEM AND HEART IN THE NORMAL AND SHOCKED ANIMALS.

In the normal animal there is a constriction of the peripheral vessels during ether anesthesia. This is indicated by plethysmograph studies of the hind leg, which uniformly show a decrease in volume during the inhalation of ether, and also by determination of the time of perfusion of a fluid through the blood vessels of the hind limb, there being a marked slowing of the rate under ether. *Further evidence was obtained from the effect of the injection of a saturated solution of ether in normal saline directly into the circulation. When the injection was made into an artery towards the head there resulted a marked rise in arterial pressure, while, when injected into a vein towards the heart, there was a fall in pressure.* This effect of ether in causing a constriction of the peripheral arterioles is true in the normal animal only. In severe shock there is no evidence of an increased constriction resulting from the administration of ether, and the normal reactions become less or are entirely absent.

The experiments mentioned above suggest an explanation for the depressive action of ether on the blood pressure in shock. *It seems probable that even in the normal animal the immediate effect of ether is a depression of the heart which accounts for the primary fall in blood pressure, but that the decreased heart output is soon compensated for by a reflex peripheral constriction, and possibly by a direct stimulation of the vascoconstrictor center by ether. The pressure thus returns to the normal level where it remains, provided that the etherization is not carried to an extreme degree. In shock, on the other hand, while there is a similar depression of the heart, there is an impairment of the normal vasomotor reactions and the compensatory constriction fails to take place, and thus there is a continued fall in blood pressure.*

The question of how the various agencies act, which cause a disturbance in the normal circulatory control, deserves further consideration. The condition of ether sensitiveness is always associated with shock, and is gradually developed under any circumstances that depress the general bodily condition of the animal, especially low blood pressure, and, as indicated above, the influence seems to be on the vasomotor center or peripheral mechanism rather than on the heart. Experiments, previously mentioned, indicate that the fall in blood pressure, resulting from ether, is brought about through an effect on the heart and that this is normally compensated for, to a considerable extent, by a peripheral constriction mediated through the vasomotor system. In shock this mechanism appears to be no longer functioning, with the result that ether causes a continuous drop in pressure as the depth of anesthesia is increased. Two possible explanations suggest themselves to explain this change in the reaction of the circulation to ether. There is some evidence that the low blood pressure accompanying shock results in a depression of the vasomotor center, so that it no longer reacts in a normal manner to a fall in pressure or other stimulus. Secondly, there is the possibility that in this condition of ether sensitivity there already exists a maximum contraction of the arterioles so that there is no possibility of a further increase in the peripheral resistance to compensate for the lessened output of the heart. The increase in the depressive effect of ether occurring immediately after a severe hemorrhage must be explained on the latter assumption, and possibly also that occurring in the early stages of shock. This is supported by a series of experiments recently completed on the perfusion time of normal saline through the vessels of the hind limb during the development of shock. There was found to be a gradual decrease in the perfusion rate indicating an increased constriction of the peripheral vessels.

SUMMARY.

The main points of the research may be briefly summarized as follows:

1. In the normal animal, ether, rapidly administered, causes a moderate fall in blood pressure, followed immediately by a recovery, so that by the time a degree of anesthetization is reached sufficient to cause a disappearance of the eye reflex, the pressure is normal. In shock the animal becomes very sensitive to ether, the same degree of anesthesia produced under exactly similar conditions resulting in a marked drop in blood pressure.

2. An increased sensitiveness to ether is brought about by any circumstances which tend to depress the general condition of the animal such as low blood pressure, hemorrhage, severe operation, or the injection of acid into the circulation.

3. In a shocked animal, sensitive to ether, nitrous oxid and oxygen may be given in the most favorable proportions, so as to produce the same degree of anesthesia produced by ether without causing a fall in blood pressure.

4. Experiments on the heart volume in intact cats, and on contractions of the isolated turtle heart, together with deductions from blood pressure, show that ether, from the very beginning of its administration, results in a depression of the heart and a decrease in its output, which is sufficient to account for the fall in pressure in both the normal and the shocked animal.

5. Large doses of adrenalin injected intravenously in shocked animals usually results in the disappearance of the sensitiveness to ether for a period of an hour or more. The evidence indicates that adrenalin acts on the heart in a manner which antagonizes the effects of ether. Pituitrin does not influence the pressure drop produced by ether in the shocked animal.

6. Determinations of leg volume with a plethysmograph, perfusion experiments, and results obtained from the injection of ether directly into the circulation, together with the form of the blood pressure curves, indicate that ether causes a contraction of the peripheral vessels in the normal animal. This construction is caused (*a*) by a direct stimulation of the vasomotor center and (*b*) by a reflex to the fall in pressure resulting from depression of the heart. In shock no evidence of a vasoconstriction produced by ether was obtained, and pressor effects from asphyxia or sensory nerve stimulation become less or are entirely absent.

7. The cause of the greater depressing influence of ether on the blood pressure in shock, is a disturbance of the vasomotor system. The usual compensatory constriction no longer occurs to offset the decreased output of the heart, so that there is no recovery of the blood pressure during the inhalation of ether, but instead, the pressure continues to fall. This might be due to a depression of the vasomotor center or to an already existing maximum constriction, so that there would be no compensation.

240 Longwood Ave.

Book Review

Handbook of Anesthetics. By J. Stuart Ross, M.B., Ch.B., F.R.C.S.E.; with an introduction by H. Alexis Thomson, C.M.G., M.D., F.R.C.S.E., and Chapters upon Local and Spinal Anesthesia by Wm. Quarry Wood, M.D., F.R.C.S.E., and Upon Intratracheal Anesthesia by H. Torrance Thomson, M.D., F.R.C.S.E. William Wood & Co., Publishers, New York City.

Ross' book is an attempt to present to the student and practitioner a condensed account of modern anesthetic views and practice. He has tried to lay emphasis upon the relation of anesthesia to general medical science rather than to elaborate upon descriptions of anesthetic apparatus and methods which a few years hence may be superseded. He devotes the initial chapters of his book to an account of the various forces which modify the physiology of the patient during an operation under a general anesthetic in the hope that such knowledge will provide a sound basis for forming a judgment upon new methods and appliances as they are being used in the current practice of anesthesia. Mr. Wood contributes special chapters on local and spinal anesthesia and Dr. Torrance Thomson adds a monograph on intratracheal aesthesia. The volume is replete with valuable information.

American Journal of Surgery

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ANESTHESIA *and* ANALGESIA

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F. HOEFFER McMECHAN, A.M., M.D., ***Editor***
Avon Lake, Ohio, U.S.A.

JULY EDITORIALS 1920

THE REAL PROBLEM IN ANESTHESIA.

The following editorial from *The Medical Brief*, April, 1920, is of very pertinent interest to all anesthetists.

"The crucial question in anesthetics is that of their comparative safety to life, consistent with a sufficient profound degree of anesthesia. We say *comparative safety;* for it seems to be universally recognized that there can be no anesthesia at all without some degree of risk to life. This apparently established fact is the pivotal center about which all the discussions and arguments circle around, without ever seeming to get any nearer to the inner significance of the fact itself. In the complex multiplication of ulterior considerations, the simple elementary truths of anesthesia appear to have been lost sight of, and to need restating.

The primary purpose of anesthesia, of course, is to relieve the patient of the physical and mental anguish attendant upon a surgical operation. Secondarily, it is desirable to relax the musculature enough to enable the operator to work more leisurely and thoroughly, and with less traumatism to the tissues. As a matter of cause and effect, however, this latter condition is a sequitur of the former, since the objectionable tension and resistance are brought about through the physical and mental irritation referred to.

This suffering of mind and body is not, in the last analysis, a phenomenon of neurons and reflexes, but of sentient consciousness. From the physiologist's point of view there is no such thing as subconsciousness; attention is associated with every mental process, and a sensation implies the exercise of a certain amount of attention. In the highly developed organism of a human being, no part or function is normally exempt from this mental attention or consciousness. There are no short-circuit reflexes. Every periphery, whether cutaneous, muscular, vascular, visceral, or what-not, is directly in the circuit of the brain, and both influences and is influenced by the brain. The day of regarding spinal arcs as independent centers, and the so-called spinal reflexes as performed independently of the brain, has long since gone by. We know that apart from cerebral influence they cannot be performed at all, and some degree of mental attention enters into every functional process.

The problem for anesthesia is to create an interruption in these long circuits, between the peripheries which are to be attacked in surgical operation and the sentient centers in the cerebrum, of sufficient effectiveness to prohibit a reaction of the former in the latter, but not sufficient to cut off that influence of the latter upon the former which is necessary to the maintenance of life and vital function. The real danger in the process lies in the fact that under anesthesia profound enough to confer immunity from sensation, the vital functions, to the extent of their anesthetization, are temporarily deprived of that quickening and equalizing influence of the brain which normally acts both as a safety gauge and a governor of the vital forces.

Judged from this standpoint, local anesthesia is of course the ideal condition for operation; that is to say, an interruption of those circuits only which connect the circumscribed field of operation with the sentient centers, leaving all other structures and functions of the body in integral communication with the brain. Such a condition not only preserves, whole and active, a thousand channels through which the organism clings to life for one channel that it suspends, but the abnormal reaction of the temporarily impaired function, registering itself through the many intact communications with the rest of the organism, will maintain an equalization which will quickly restore normality to the part when the anesthetic is withdrawn.

Unfortunately, the practicable range of local anesthesia is very limited. In far the greater proportion of cases we are clumsily obliged to interrupt all the circuits for the purpose of catching within the zone of interruption the particular circuit with which we are concerned—very much like the old Chinese trick of burning the house down to roast the pig. This is accomplished by chemical agents—ether, chloroform, etc.—which exert their somnolent effects from above downward, impairing first the circuits of higher consciousness and gradually depressing the sentient centers until even the lower reflexes scarcely react in them.

More recently a move has been made to popularize a method whose modus operandi is midway between that of a general and a local anesthetic—the so-called spinal anesthesia. The problem and essential danger, however, are identical with those of the older method, namely, the delicacy of the balance between interruption of sentient and that of vital circuits. Considerations of blood pressure, respiration waves, and the like, are mere straws on the surface, showing which way the tide is flowing. The real underlying element of danger in the anesthetized organism is that it is cut off from its supreme control of its own vital function, and while thus cut off in every circuit, the least overstepping of the vital limit in any one important circuit fails to register itself in the cerebral clearing-house, so that no compensatory process is invoked, and the organism succumbs.

That method of anesthesia which will enable us to block only that particular circuit concerned in the operation is, of course, the ideal method. Failing that, or until that be attained, the method which affords the greatest available facility for measuring and regulating the degree of sentient interruption, and maintaining the greatest degree of vital integrity of the long circuits, must be regarded as the most desirable system of anesthesia."

THE UNIVERSITY OF MARYLAND MEDICAL SCHOOL APPOINTS A PROFESSOR OF ANESTHESIA.

The editor of the Supplement is in receipt of information that the University of Maryland Medical School, which several years ago created a separate Department of Anesthesia with Dr. Griffith S. Davis, of Baltimore, at its head, has made him a full Professor of anesthesia. This is one of the first professorships of anesthesia to be established in this country and it is to be hoped that all medical schools, worthy of the name, will soon follow the example set by the University of Maryland.

It is understood that a great deal of interest is also being taken in the teaching of anesthesia in the University of Maryland Dental School.

THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA AND THE NURSE ANESTHETIST.

At a recent and largely attended meeting of the Medical Society of the District of Columbia the following Resolution was adopted by a vote of over 5 to 1 of the members present.

Resolved that the Medical Society of the District of Columbia go on record as in favor of the limitation of the practice of anesthesia to regularly licensed physicians, surgeons and dentists, and graduate nurses in cases of emergency or medical students for purposes of instruction.

As the Medical Society of the District of Columbia has a membership of 1237 physicians, a number greater than the membership of some 15 other state medical societies, this expression of opinion carries a great deal of weight.

Efforts by proponents of the lay anesthetist to defeat this Resolution by all sorts of parliamentary tactics were voted down repeatedly and almost unanimously.

It is to be hoped that prominent anesthetists throughout the country will have their local, county and state societies take similar action. Also in support of the movement of the American Association of Anesthetists it is very desirable that every state medical association be induced to pass the following Resolution:

Whereas the safety of patients, progress of surgery and hospital service demand the rapid extension of the specialty of anesthesia, therefore

Be it resolved that the .... State Medical Association hereby instructs its Delegates to secure the establishment of a Section on Anesthesia in the American Medical Association at the Boston meeting, June, 1921.

Any developments in this connection should be notified to Dr. James T. Gwathmey, 40 East 41st St., New York City.

THE CALIFORNIA STATE MEDICAL SOCIETY AND NON-MEDICAL PRACTITIONERS OF THE MEDICAL SPECIALTIES.

The following excerpt from an editorial in the June issue of the Southern California *Practitioner* points out the commercial attraction of the medical specialties to non-medical practitioners and details the action of the California State Medical Society, at the recent Santa Barbara meeting on the use of lay persons as anesthetists:

"Medicine, the noblest of professions, is the most despicable of business. The worshiper of mammon is a decidedly incongruous figure in the altruistic field of the practice of medicine. The essential respectability that has long been recognized as a characteristic of the honorable members of our profession, is attractive to the commercially inclined unqualified practitioners of the healing art, and is often unsuccessfully aped by them. A stronger attraction to the unqualified non-medical practitioners of the medical specialties is afforded by the possible financial returns. The remuneration of the practice of medicine is absurdly low for those who are properly qualified, so much so that the practice of medicine is no longer regarded as an attractive field in a financial way. But to the unqualified the practice of the medical specialties promises financial returns out of all proportion to the true worth of the services they are able to render in this or any other way, so that they are tempted to be unscrupulous in the extreme and to resort to all sorts of expedients to enable them to continue in their dangerous practices.

"At the Santa Barbara meeting, our State Medical Society declared that the administration of an anesthetic is always the function of a legally qualified medical practitioner; that the administration is best performed by physicians specially instructed or who have made a specialty of this subject; that wherever available, hospitals and public institutions, where anesthetics are administered, employ only physicians as anesthetists; that the Society condemns under all circumstances the training and qualification of lay persons as anesthetists; that no hospital shall be deemed to have acceptable standards, which charges a fee for anesthetics unless such anesthetic has been administered by a legally qualified physician.

"The more closely this action of our State Society is scrutinized, the more we must be impressed by the good judgment it portrays."

Society Proceedings

Membership in a society devoted to your specialty is an essential to success.

INTERSTATE ASSOCIATION OF ANESTHETISTS SIXTH ANNUAL MEETING; JOINT SESSION WITH THE PENNSYLVANIA STATE MEDICAL ASSOCIATION AND THE NATIONAL ANESTHESIA RESEARCH SOCIETY.

The Interstate Association of Anesthetists will hold its Sixth Annual Meeting in Pittsburgh, Pa., October 4-7, in conjunction with the Pennsylvania State Medical Association and the National Anesthesia Research Society. This will be one of the most interesting and important meetings ever held and all activities will be centered in the Hotel William Penn.

The National Anesthesia Research Society will award money prizes for the three best papers presented on researches in anesthesia. Those wishing to compete should get in touch with the secretary at once.

On Thursday afternoon, October 7, there will be a Joint Session with all the sections of the Pennsylvania State Medical Association and the following papers will be presented:

Blood Pressure Guides in Anesthesia and Operation. A. H. Miller, Providence, R. I.

Acidosis, Ketonosis and Alkylosis in Relation to Anesthesia and Operation. S. P. Reimann, Philadelphia, Pa.

Third Stage Ether Anesthesia—A Subclassification. Arthur E. Guedel, Indianapolis, Ind.

The Anesthesia Problem in Lung Surgery. James T. Gwathmey, New York City.

Nitrous Oxid Anesthesia in Normal Labor and Operative Obstetrics. W. C. Danforth, Evanston, Ill.

Nitrous Oxid-Oxygen Anesthesia for Oral and Sinus Surgery in the Forward Inclined Sitting Posture. Ira O. Denman, Toledo, O.

Other papers scheduled for the tentative program are:

Further Studies in the Effects of Anesthetics on Animals Infected with Tuberculosis Through the Respiratory Tract. J. B. Rogers, Cincinnati, O.

Further Studies in Blood Changes Under Nitrous Oxid. T. D. Casto, Philadelphia.

Further Studies in the Effects of Carbon Dioxid Inhalations After Ether Anesthesia and Operation. Yandell Henderson, New Haven, Conn., and R. C. Coburn, New York City.

Studies in Blood Pressure Reactions Under Ether-Oil Colonic Anesthesia. G. M. Geldert, Ottawa, Canada.

Air Control and the Reduction of Death Rate After Operation. E. Huntington, New Haven, Conn.

Draw-Over Ether Anesthesia with a Study and Report of Routine Results. A. S. McCormick, Akron, O.

The Oral Administration of Nitrous Oxid-Oxygen Anesthesia for Prolonged Neurological Operations. George W. Tong, New York City.

Anesthesia for Operations on Children. W. Beach, Philadelphia.

The Nasal Administration of Nitrous Oxid-Oxygen Anesthesia for Long Oral Operations. Bissell Palmer, Jr., New York City.

Nitrous Oxid-Oxygen-Anesthol Anesthesia for Extraction Operations. M. Ecker, New York City.

Lessons from Non-Fatal Accidents Under Anesthesia. R. M. Waters, Sioux City, Iowa.

Primary and Secondary Nitrous Oxid Saturation as a Test of the Patient's Capacity for Withstanding Operation. E. I. McKesson, Toledo, O.

The Hemoglobin Content as an Index of Oxygen Requirement During Anesthesia. W. I. Jones and Clayton McPeek, Columbus, O.

Clinical Observations on Anesthetizing the Tuberculous. W. J. Hunnicutt, Asheville, N. C.

Bodily Changes and Reactions to Low Tensions of Oxygen. E. C. Schneider, Mineola. L. I.

An effort is being made to have the Western Pennsylvania Odontological Society cooperate in the Session on Anesthesia for Oral Surgery and Dentistry.

If possible Clinics to demonstrate some of the latest advances in anesthetic technic will be held on Wednesday and Thursday morning previous to the Scientific Sessions.

The Annual Dinner will be held in the Hotel William Penn on Tuesday evening, October 5.

As usual, the Visiting Ladies will be delightfully entertained and you are requested to notify the Secretary in advance how many will be in your party.

As the Hotels William Penn and Fort Pitt are under the same management reservations in either will secure you the best of accommodations and service during the meeting. Make your reservations at once.

For further information and details address F. H. McMechan, M. D., Secretary, Avon Lake, Ohio.

AMERICAN ASSOCIATION OF ANESTHETISTS—EIGHTH ANNUAL MEETING.

The American Association of Anesthetists held its Eighth Annual Meeting at the Grunewald Hotel, New Orleans, La., April 26-27, with Dr. A. H. Miller, Providence, R. I., in the chair.

During the opening Executive Session the minutes of the 1919 meeting at Atlantic City were accepted as read. The Secretary-Treasurer's report was also accepted as presented. The following officers were elected for the forthcoming year: President, Dr. Jos. E. Lumbard, New York City; Vice-Presidents, Dr. F. L. Richardson, Boston, Mass., and Dr. Eleanor Seymour, Los Angeles, Cal.; Secretary-Treasurer, Dr. F. H. McMechan, Avon Lake, O.; Executive Committee, Dr. John J. Buettner, Syracuse, N. Y., and Dr. Paul Lux, Kansas City, Mo.

The following anesthetists of the allied professions were elected to membership: Drs. Lewis S. Booth, New York City; Robert Burrows, San Francisco; Archer C. Bush, Verona, N. J.; McKeen Cattell, Boston; Etta Charles, Anderson, Ind.; Harry T. Cooke, Los Angeles; Arthur M. Dodge, Boston; Bernard C. Dorset, Denver; M. Ecker, New York City; Arthur E. Guedel, Indianapolis; Harry Harrison, Norfolk; O. C. Hickman, Denver; W. J. Hunnicutt, Asheville, N. C.; W. I. Jones, Columbus, O.; Nettie Klein, Texarkana, Texas; E. O. Laughlin, Paris, Ill.; Mary A. Leavitt, Boston; F. H. Mathews, Providence, R. I; C. W. Metz, Denver; Samuel W. Moore, Baltimore; L. A. Rithwilm, San Francisco; Karl F. Roehrig, Denver; Olin W. Rodgers, Knoxville; Lucretius H. Ross, Bennington, Vt.; S. E. Sawyer, Lewiston, Me.; Arthur T. Schoonmaker, Westfield, Mass.; Roy C. Seamans, Batavia, N. Y.; O. H. Seifert, Springfield, Ill.; Albert E. Small, Melrose, Mass.; J. P. Wahl, New Orleans, and Marion L. White, Dixon, Ill.

During the scientific sessions papers were presented by the following: Drs. A. H. Miller, Provideence, R. I.; F. C. Mann, Rochester, Minn.; McKeen Cattell, Boston; Jos. E. Lumbard, New York City; Ralph M. Waters, Sioux City, Ia.; John R. Worley, Dallas, Texas; James T. Gwathmey, New York City; Ansel M. Caine, New Orleans; E. I. McKesson, Toledo, O.; A. Ficklen, New Orleans, and George Piness, Los Angeles.

The Symposium on the Problem of Anesthesia in Goiter Operations was participated in by the following: Drs. André Crotti, Columbus, O.; Vilray P. Blair, St. Louis; W. E. Lower, Cleveland; Lincoln T. Sise, Boston; Carroll W. Allen, New Orleans, and Walter Lathrop, Hazelton, Pa.

During the second Executive Session the Secretary was instructed to cooperate with the Surgeons General of the United States Army and Navy in accomplishing the initiation and maintenance of expert anesthesia in these services. The following resolution regarding the lay-anesthetist was unanimously adopted:

Whereas, The American Association of Anesthetists is committed to the advancement of the science and art of anesthesia in all that relates to the welfare and humanity, through the medical and dental professions, and

Whereas, The advances in medical science are making it increasingly clear that the administration of anesthetics is a factor of practically equal importance with diagnosis, treatment and operation, and

Whereas, There is an increasing disposition on the part of a few surgeons and hospitals to commit the administration of anesthetics to nurses, office assistants and others without adequate qualifications, exploiting such services to their commercial advantage, according to testimony adduced before this association, thus jeopardizing the health and welfare of patients and increasing the death rate in operations, and

Whereas, Anesthesia is in a state of evolution and those who advocate lay anesthesia would defeat any further progress in this branch of medicine,

Therefore, be it resolved, That the American Association of Anesthetists places itself on record as unalterably opposed to the employment of lay anesthetists, nurse anesthetists and all other types of anesthetists who shall not have graduated from recognized medical or dental colleges and have been licensed to practice medicine or dentistry, and

Be it resolved further, That the American Association of Anesthetists will inaugurate and prosecute legislation to protect the medical and dental profession and the public from such inadequately educated and trained anesthetists whenever such action is necessary.

The resignations of the following members were accepted with regret: Drs. Lillian Mueller, Indianapolis; H. B. Patterson, Pittsburgh; H. A. Sanders, Pasadena, Cal.; and G. F. Sammis, Brooklyn.

To carry out the welfare proposals made in the address of the President, the Association voted unanimously to have him appoint standing committees on Records and Statistics, Instruction in Anesthesia in Medical Schools and Hospitals, Anesthetic Agents and Methods, Revision of the Constitution and Organization and Relations with Medical and Surgical Societies.

The Secretary was voted an appropriation of $300 for his services during the past year.

The Annual Dinner was well attended and enjoyed by all. The Secretary acted as Toastmaster and after-dinner speeches were given by Dr. Charles Chassaignac, New Orleans; Dr. John Osborn Polak, Brooklyn; Prof. Desmarest, Paris, France; Mr. James McLoughlin, New Orleans, and Commander W. Seaman Bainbridge, M. C., U. S. N. R., New York City. The Association also was honored by having as its guests the ranking officers of the medical service of the Cuban Navy and Army, Lt.-Com. Feugera and Major Guerrera.

Through the courtesy of Mrs. Ansel M. Caine and other wives of New Orleans physicians the visiting ladies of the anesthetists were delightfully entertained, Tuesday noon, at luncheon at the Yacht Club and were later taken on an auto sight-seeing trip of the city, stopping at the Country Club for the The Dansant.

The Association adjourned to meet in Boston, June, 1921, the first two days of A. M. A. week.

Quarterly Index

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TREATMENT OF CANCER WITHIN THE RECTUM.

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Chicago, Ill.

Cancer of the rectum below the level of the pelvic brim and above two inches from the anus is best removed by a combined abdominal and perineal operation as first performed by Czerny in 1884. Various modifications of the original technic have been described because our method of approach cannot be constant, but depends rather upon the extent of the disease, the involvement of other structures and organs, the patient's age, sex and physical condition. Sometimes it is possible to bring the proximal gut down through the sphincter and attach it to the skin, thus preserving the anus in its normal location, but such a procedure leads to the danger of leaving it situ intestine or lymphatics which contain particles of malignant disease.

In all cases where the rectal ampulla is involved an exploratory abdominal section should be made through a liberal median incision.

Where cancer is limited to the colon or movable sigmoid and is entirely surrounded by peritoneum it may be lifted out of the abdominal wound. This operation is quickly performed and causes no great mutilation of the tissues. But where the growth extends below the promontory of the sacrum and is but partially covered with peritoneum, a complete removal through an abdominal incision is attended with many difficulties and mishaps and the combined abdominal-perineal operation is unquestionably the best. It permits a careful examination of the liver and the lymphatics for metastasis and by closely noting the extent of involvement of the rectum and contiguous organs determines definitely whether continuity of the bowel to the anal region may be maintained or whether a permanent artificial anus must be provided. This operation offers the patient the best chance of ultimate recovery and freedom from recurrence. With perineal methods, even after the most complete and extensive removal possible, whereby recurrence in the immediate vicinity is reduced, nevertheless new growths appear in situations beyond the scope of removal via the perineum. Post-mortem examinations show that these recurrences are in (a) the pelvic peritoneum, (b) the pelvic mesocolon and (c) the lymph nodes situated over the bifurcation of the left common iliac artery. In all cases the infiltration of the parietal border of the pelvic mesocolon causes shrinkage of the pelvic mesocolon itself, whereby the pelvic colon appears to be 'bound down, a condition which readily explains the difficulty in obtaining a satisfactory spur when performing colostomy in an advanced case of cancer of the rectum.

From these observations it is obvious that the above-mentioned structures constitute the zone of the upward spread of cancer from the rectum, the removal of which is just as imperative as is the thorough clearance of the axilla in cases of cancer of the breast if freedom from recurrence is to be hoped for.

The study of the spread of cancer from the rectum has led me to formulate certain essentials in the technic of the operation which must be strictly adhered to if satisfactory results are to be obtained, namely:

1. That an abdominal anus is necessary.
2. That the whole pelvic colon, with the exception of the part from which the colostomy is made, must be removed because its blood supply is contained in the zone of upward spread.
3. That the whole of the pelvic mesocolon below the point where it crosses the common iliac artery, together with a strip of peritoneum at least an inch wide on either side of it, must be cleared away;
4. That the group of lymph nodes situated over the bifurcation of the common iliac artery are in all instances to be removed;
5. That the peritoneal portion of the operation should be carried out as widely as possible so that the lateral and downward zones of spread may be effectively extirpated.

Excision of the rectum is one of the most formidable operations in surgery, entailing, as it does, the removal of practically the whole of the pelvic colon as well as the rectum. A word regarding the practical anatomy and technic will therefore not be amiss. The pelvic portion of the sigmoid is about 16 inches long and extends from the edge of the psoas muscle to the level of the third sacral vertebra. It makes a horseshoe-shaped loop and has a mesentery 1¼ to 3½ inches long. The length of the loop and also its mesentery is quite variable.

In all cases a preliminary left inguinal colostomy should be performed at least two weeks before the operation and during the interval such attention given as will help to fortify the patient for the removal of the cancer later. Beginning two days before the operation he is given the usual preparation for a laparotomy. When he is anesthetized, the rectum is irrigated with formalin or bichloride solution followed with full strength peroxide of hydrogen.

The patient is placed in the Trendelenburg position and the abdomen is opened with a four inch incision in the median line. A liberal opening is necessary to allow working space. The small intestines are thoroughly packed back to facilitate a clear view of the lower sigmoid and rectum as well as to prevent unnecessary handling and encroachment of other parts of the intestines. The patient is then returned to the horizontal and the sigmoid is lifted out of the wound and held taut, thus bringing the sigmoidal artery prominently into view. The peritoneal covering of the mesosigmoid is slit open close to the gut about two inches above the growth, and with a pair of blunt pointed scissors the incision is continued along about one-half inch from the margin of the gut, thus separating the peritoneal wall from the vessels. This dissection is continued from the sigmoid back to the peritoneal reflexion on the posterior abdominal wall and the ileum. The bowel is then laid on the other side and the peritoneum similarly elevated on that side. The sigmoid artery is traced to its origin in the superior hemorrhoidal artery and just above the junction of the superior hemorrhoidal artery is tied with two ligatures and cut between. In the female the left broad ligament should be detached together with the left ovary and tube. This having been done, the pelvic mesocolon, together with the adjacent strip of peritoneum on either side of it, is detached from the hollow of the sacrum. By keeping close to the anterior sacral ligaments, the cellular tissue containing the lymph nodes in that situation is detached with the pelvic mesocolon in one piece. This separation is continued downwards in the middle line as far as the sacrococcygeal articulation. The sacral wound is now filled with gauze while a similar method of blunt dissection is carried out anteriorly by which means the bladder is detached as far as the prostate gland. Attention is now paid to the separation of the lateral aspects of the rectum and it is here that great care must be exercised to avoid injuring the left ureter, which adheres closely to the peritoneum as it skirts the wall of the pelvis. When the ureter has been defined it should be carefully freed as far as the base of the bladder. On the right side the ureter need not be seen. The dissection is then carried downwards on either side and the lateral ligaments of the rectum are divided with scissors. In these structures the middle hemorrhoidal arteries are found, but seldom require a ligature. This lateral dissection is carried down to the upper surface of the levator ani.

When the rectum has thus been freed on all sides as far as the points indicated, the bowel having been widely loosened should easily reach the normal anus without tension. If it does not do so the operator determines whether it is held by the mesosigmoid or by the bloodvessels. If the mesosigmoid needs further loosening it should be incised. The blood supply is next examined to be sure it is sufficient before proceeding. Arterial capillary pulsation must be felt in the parts. At the rectosigmoid junction is a portion of the bowel sparingly supplied with end branches. The lower sigmoid arteries supply from above, and from this point down the bowel is supplied by the superior hemorrhoidal, but these two arterial systems do not anastomose. If the superior hemorrhoidal is cut above its distribution to the rectum the lower end of the gut will not have sufficient blood supply and will slough, thus causing infection and death. This is a pertinent question in every case of cancer above the level of the floor of Douglas' pouch. When satisfied that the divided bowel will reach the anus with good blood supply the abdomen is well protected with pads and the bowel divided with a cautery and the bowel ends closed with Lembert sutures. The rectum is now separated from the lateral ligaments and the whole of the detached structures are crowded down into the pelvis and covered with sterile gauze. Provided that the divided end of the colon has been firmly closed, considerable pressure may be made upon it from above without fear of leakage. The edges of the pelvic floor, and the abdominal incision is closed. The patient is then placed in the exaggerated lithotomy position and the detached mass is extirpated through the perineal route as in cancer at the anus. The proximal end of the gut is brought out at the perineal wound or as an abdominal anus as best suits the individual case.

When the cancer is situated high in the sigmoid efforts at removing it and providing the continuity of the lumen of the gut by end-to-end anastomosis or lateral anastomosis have been followed by a very high mortality due to leakage.

INJURIES TO THE WRIST.

Jeanne Mauchet,
Rouen, France.
and
Albert Mauchet,
Paris, France.

We shall consider only the bony and articular lesions of the wrist, excluding the lesions of the soft parts, which are nearly always associated with wounds of the integument. This subject is one of the oldest and newest in the field of pathology; it is as old as medical observation itself, but on the other hand it is actually a recent subject, because for the last few years, there has been great divergence of opinion as to the interpretation of lesions at the wrist, and their mechanism is still under discussion.

From the time of antiquity up to the middle of the 18th century, traumatisms of this region were considered as radio-carpal luxations.

It was not until the description of Pouteau which appeared 30 years before that of Colles, that the fracture of the lower end of the radius was brought clearly to light and its extreme frequency proved, quite overshadowing that of articular displacements, theretofore regarded as the most common wrist lesion. Indeed, Dupuytren denied the occurrence of these latter, and so blindly were this great surgeon's teachings accepted that fracture of the radius came to be the only recognized traumatic lesion at the wrist. But the era of controversy has ended. During the last 20 years, radiography has definitely cleared up all uncertainties. It has shown that while fractures of the radius are by far the most frequent lesion, they do not comprise the entire traumatic pathology of the region. *Luxations of the carpus* do occur, are seen frequently and have a serious prognosis. However, it is not total displacements of the wrist, dislocations of the carpus *en masse,* which are extremely rare, that the average surgeon is apt to encounter, but the *partial* luxations, isolated luxation of the small carpal bones, and especially those which we shall term the *"sub-total retro-lunar luxations."*

Radiography alone is not sufficient to explain the mechanism of these lesions, it cannot portray the important rôle of the ligaments, which only experimentation has been able to demonstrate. We have associated the two methods of investigation, they complete and control each other, reciprocally.

Thus it will be seen that our knowledge of traumatisms of the wrist has been revised by modern researches, to which we have added our own personal contribution. In fact the investigations of the present epoch, are sufficiently numerous and fruitful to completely alter this field of pathology. But in view of the fact that we are to present only a brief paper, we limit ourselves to the three most important types amongst the numerous varieties of traumatisms of the wrist:

(1) Fracture of the radius occupies the first position. We know definitely that there are two types, different both in their lesions and in their production. The first is fracture by tearing apart (arrachement), extra-articular, at about one and a half centimeters above the joint, without impaction; the other is the fracture by compression (enfoncement) onto the carpal bulk, intra- and extra-articular at the same time, often comminuted, with much impaction, and always most prominent posteriorly.

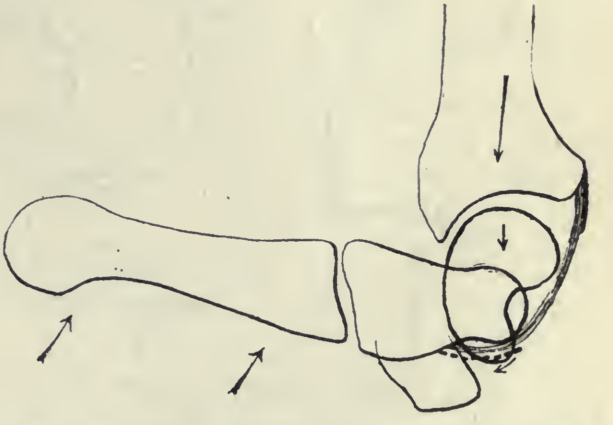


Fig. 1—Mechanism of fracture of the scaphoid by opening of the angle (by extension). The bone is broken in attempting to reassume the normal position, the vault impinging against the radius. The small arrows at either end of the bone do not converge. The large arrow above indicates the radial push, the other two large arrows indicate the points which bear the weight of the fall. The dotted line indicates the scapho-capital ligament whose action is considerable.

(2) Among the small bones of the carpus, the situation, shape, and physiology of the scaphoid compel it to function in such fashion as to predispose it to fracture.

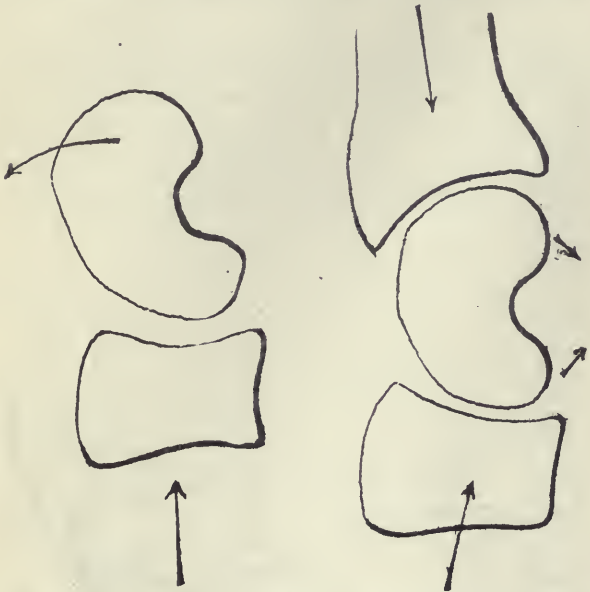
We have found two mechanisms of fracture of the scaphoid—same are produced by *exaggeration of the argulation* of its two component parts, vault and base, i. e. *by extension*; others are due to closure of this angle, i. e. *by flexion.*

Figures 1, 2 and 3 illustrate this.

(3) There is finally, the curious lesion called, by some, forward dislocation of the semilunar and, by others, backward dislocation of the os magnum, and which is considered by ourselves, subtotal retrolunar displacement of the carpus. It is characterized by the fact that not only does the os magnum pass behind the semilunar, but also all the other small bones of the carpus (figure 4).

How is this lesion produced? Nearly always by a fall in hyperextension on the metacarpus, or on the ball of the hand, particularly if the ball of the hand is only turned moderately backward, and inclined at the same time, towards the ulnar side.

The essential mechanism is as follows, the anterior ligament is torn, invariably between the semilunar and os magnum. The head of the latter is released from its semilunar cap and passes through the hiatus in the capsule. The dorsal horn of the semilunar slides over the neck of the os magnum, then over the vault and finally reaches a position anterior to the os magnum. When the hand returns to its proper position, the head of the os magnum passes definitely behind with the rest of the carpus. (figures 5, 6, 7).



Figs. 2 and 3—Diagrams to explain the mechanism of fracture of the scaphoid by flexion, due to a fall in supported hyperextension.

Fig. 2—When the trapezium pushes from below upwards, against the base of the scaphoid, the vault of the scaphoid rotates backwards if not opposed by the radius.

Fig. 3—The radius is pictured; it bears down with full weight on the vault of the scaphoid, prevents the scaphoid from rotating backwards, the angle of the scaphoid is diminished, and the bone is fractured by flexion-closure of the angle.

The semilunar may remain in complete articulation with the radius; usually, however, it see-saws more or less, with a tendency to assume a vertical position; occasionally it is enucleated like a cherry pit and is separated altogether from the radius.

Finally, fracture of the scaphoid by extension is often associated with subtotal luxation, without any marked alteration in the character of the displacement. (In more than half of the cases).

This subtotal luxation of the carpus practically always occurs in adults, between the ages of twenty and fifty years, and usually in men who have been subjected to a violent traumatism (fall from a certain height,—masons, carpenters, roofers; fall from a horse, bicycle or aeroplane; rebound of the crank of an automobile.)

Severe pain and swelling of the wrist, are the first signs. The carpus is widened in the antero-posterior direction; it is at the same time foreshortened, at least when the semilunar is enucleated. The normal relation of the styloids of the ulna and radius is maintained, the latter slightly lower; this sign enabling us to exclude fracture of the lower end of the radius, and to consider a lesion of the carpus. Care must be taken not to mistake the interior part of the radius for the styloid of the radius, because when the styloid is detached by a fracture, it assumes a position in front of the radius. It is always necessary in addition, to radiograph the parts, making at least two plates, an antero-posterior and a lateral.

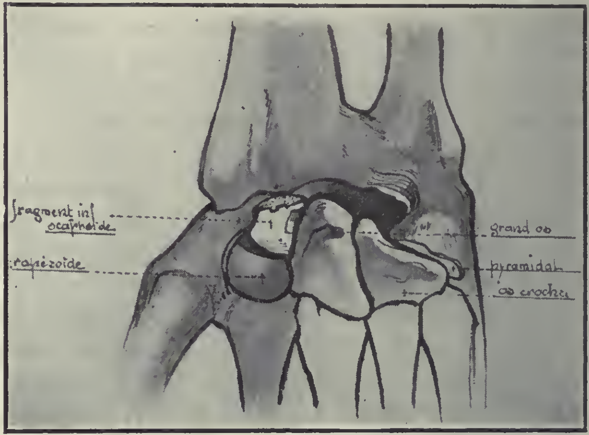


Fig. 4—Subtotal retro-lunar luxation of the carpus, with fracture of the scaphoid.

The semi-lunar is displaced forward and remains invisible from behind.

The deformity caused by retro-lunar subluxation is sometimes similar to the silver-fork deformity caused by fracture of the radius, but the hump of the fork is situated further down.

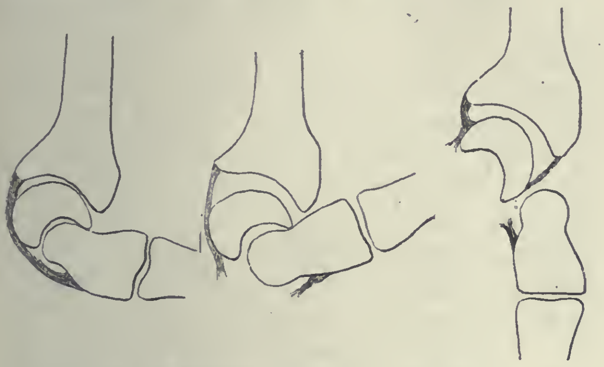
The anterior projection of the semilunar cannot be palpated, except when the bone is enucleated, and especially if it has rotated (90° or occasionally 180°). This projection must be looked for above the inferior fold of the wrist; the semilunar is an antibrachial bone.

The complications of nerve compression (the ulnar sometimes, but usually the median caused by the straddling of the semilunar) is frequent.

When a retro-lunar luxation has existed undiagnosed and the surgeon is called in at the end of three or four weeks, two symptoms should immediately excite suspicion of this carpal lesion—first, the attitude of the hand which remains "fixed," an excellent but inconstant sign; second, marked weakness in flexion of the fingers and in grasping. This weakness is always the consequence of a luxation of the carpus, it is rarely seen in fracture of the lower end of the radius.

It should be emphasized, that subtotal luxation of the carpus is a serious injury, if not properly treated. Undoubtedly, there are scattered cases, in which fairly good functional results have been obtained without treatment, but these are exceptional.

When this lesion is associated with a fracture of the scaphoid or any other carpal bone (os magnum, for example) the prognosis is worse.



Figs. 5, 6, 7—Mechanism of subtotal retro-lunar luxation of the carpus.

Fig. 5, first stage—Hyperextension at right angles. Capsule intact, but stretched to its maximum.

Fig. 6, second stage—Hyperextension beyond right angles. The capsule is torn, beneath the semi-lunar. The os magnum accentuates the flexion of its head, which now protrudes from its socket.

Fig. 7, third stage—The semi-lunar has slid over the neck of the os magnum, and nas posted itself according to the traction of the radio-lunar ligaments. The luxation is established.

Retro-lunar luxation of the carpus demands reduction, like all other dislocations, even when associated with fracture of a carpal bone, or nerve lesions. The only possible danger in reduction exists in those cases where the semilunar is dislocated 90°, or where the lesion has existed for more than a month. But even if intervention is delayed for more than a month, reduction is feasible and effectual. It should be done under general anesthesia. The surgeon should grasp the hand of the patient firmly, and exert traction in the direction of the axis of the forearm, at the same time moving the wrist slightly so as to make it supple. The hand is then brought into dorsal flexion, while traction is maintained and inclined slightly to the ulnar side. At the same time, pressure is exerted gently with the thumb over the palmar surface of the semilunar. Finally, the surgeon moves the hand, quickly from dorsal to palmar flexion. During this manipulation the semi-lunar may be felt slipping into place. This is followed by immobilization for four or five days, hot baths, hot air, gentle and slow mobilization. A slight stiffness of the wrist often remains.

If the condition has been properly reduced the luxation will not recur. The misnamed recurrences are luxations that were not really reduced. Reduction should be immediately verified by a profile radiograph.

In case the semilunar is fractured, or the condition has lasted more than one month, reduction should not be attempted; the semilunar should be removed under local anesthesia, with the superior fragment of the scaphoid, (if fractured). The incision is made on the palmar surface just within the palmaris longus.

This new chapter of surgical pathology has been written by French science. The names of Destot, and de Pierre who first discovered the lesion, head the list. We have followed the work of these leaders, have made an experimental study of the articular physiology, have added our own interpretation of the mechanism of the lesions, and have attempted to establish a scientific classification according to etiological and pathological factors.

In conclusion, this subject has more than theoretical importance. The practical importance of carpal lesions is great, because of the grave prognosis, when untreated. The surgeon may make a mistake in diagnosis of fracture of the radius, if so, he does himself a greater injustice than his patient. But if he overlooks a luxation of the os magnum, he condemns his patient to a serious disability.

NOTHING NEW.

One of the most difficult things of modern times is to do or say something that is entirely new. This applies to every vocation, to all walks of life. Perhaps it is because progress is a series of events, each one reflecting the other, blended and interwoven. The good surgeon, after toiling long to perfect some useful procedure, which by him is believed to be the first of its kind, carries his findings to the medical press; but the investigative curiosity aroused by the announcement of the unusual soon brings to light the fact that much of his claim to originality is already set forth in the dust-covered records of former years. Two men, writing upon kindred subjects, unconsciously follow the same line of thought and reach like conclusions. The wisest man of ancient days, gazing out into the realms of art, science and literature, if perchance he might add to his great storehouse of knowledge, exclaimed in tones of disappointment, "There is no new thing under the sun." If Solomon, with all his learning, could make this sweeping exclamation, what shall we say, after centuries of accumulated fact! Much that seems new, thereore, is forgotten lore, unveiled and recast to meet the requirements of the age.—T. L. Deavor in *The International Journal of Surgery.*

THE TREATMENT OF KNEE JOINT INFECTIONS.

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Insomuch as infection of the knee joint may owe its origin to a multitude of causative factors, necessarily the treatment must likewise be varied accordingly to adequately fulfill the indications in individual cases. The objects sought to be attained are: (a) elimination of the infection, and (b) restoration of function. Unfortunately these desiderata are not always possible of accomplishment under the most approved plans of management. The reminder may seem superfluous that in every type of joint infection conservative treatment should be given a thorough trial before resorting to more radical methods which entail complete and permanent loss of functional capacity. The object of this paper is not to review the entire subject of knee joint infections, but to specifically consider the treatment of certain types due to well recognized causes.

Tuberculosis: The treatment of tuberculous joint disease in childhood should always be conservative, since duration of the disability period is relatively an unimportant factor. Radical operation would necessitate removal of portions of the epiphysis and the epiphyseal cartilage which would result in permanent shortening of the affected limb. By mechanical treatment there is reasonable assurance of ultimate recovery from the disease with retention of the power of motion.

The treatment of a tuberculous knee in the adult is quite a different proposition. When it has been definitely determined that permanent damage has been done, thorough removal of the focus of infection is indicated. Resection is the procedure of choice, placing the knee in the position of election, which is between ten and fifteen degrees flexion; this position is most convenient to the patient in going up and down stairs and also in sitting. There is, however, more strain placed on the joint in this position, and if there is reason to believe the bones will not firmly unite, an autogenous graft should be inserted for reinforcement. Resection of the knee joint and the flexed position will create a varying degree of shortening, which may be overcome by placing a cork elevation beneath the heel and longitudinal arch of the foot inside the shoe causing the foot to acquire the position of equinus.

Osgood and Bull state that the centers of bony growth during childhood are in direct anatomic relation to the joint, and disturbance of these centers may seriously affect development of the limb. In adults the disease once established seldom fully recovers without operative intervention. The diagnosis of knee joint tuberculosis cannot be made with certainty in the acute stage. Several other monarticular affections may be mistaken therefor: subacute gonococcal infection, syphilis, villous arthritis, simple chronic arthritis, traumatic arthritis, etc. The authors believe tuberculosis may sometimes be primary in the synovia. The von Pirquet test is only of negative aid in excluding tuberculosis; the subcutaneous test is of great value; a rise in temperature, increase of local joint symptoms, such as added heat, tenderness, etc., furnish almost conclusive evidence. The roentgen ray findings are negative when the disease involves the particular cartilage before destruction occurs. Tuberculosis is a destructive process and when the bone is involved loss of substance will usually be shown; there are oftentimes lime-salt deposits beneath the periosteum; typically there is a hazy appearance of the articular surface. If the bone is diseased, excision of the joint is the procedure of choice. A plaster dressing (Spica) is applied extending from the toes to above the iliac crest. Firm callus is usually present in four to eight weeks, and weight-bearing with artificial support is commenced at two months.

In the treatment of tuberculous osteo-arthritis of the knee joint, Perera claims the immobilizing bandage is indicated only in cases where there is an acute onset, in painful arthritis, in tuberculous hydrops with notable edema, and in fungous synovitis; that it is contra-indicated in abscesses and after surgical procedures. For correcting vicious positions traction and massage are employed. Functional rest should be rigorously insisted upon without fear of ankylosis.

From various substances injected into the articulation or into abscesses, I have never noted the slightest benefit, and on several occasions am sure the treatment has been harmful, i. e., in tuberculous joints and abscesses resulting therefrom. Heliotherapy is indicated in all tuberculous joint lesions in which there is a discharging sinus or chronic ulceration from any cause. Extra-epiphyseal tuberculous foci, if any exist, should be excised. Typical resection is only a means of last resort in children; in adults it is preferable to amputation.

Gonococcal Infection: The knee joint is most frequently involved as a complication of so-called "gonorrheal" infection. Thorough treatment of the primary focus is the first indication, this to be followed by aspiration if the joint is distended with fluid. The fluid should be replaced by two per cent. formalin in glycerine as advised by Murphy and others, after which fixation dressing and traction sufficient to prevent joint contact should be applied. Existing conditions may require wide variation in the treatment of gonococcal arthritis. The articular lesions may be either acute or chronic in character, and may be noted at any period during the course of the primary infection. Vaccines have been employed in this class of cases with varying degrees of success.

A report from the Babies' Hospital, New York, shows seventy-eight cases of Neisserian infection among which there were ten cases of arthritis. Six of the patients died from the disease, and two others succumbed later from exhaustion despite the fact that the most modern methods of treatment had been employed. In three cases of this type in adults referred to me it became necessary to resort to resection of the knee joint, there being only a few degrees of remaining motion. These cases were characterized by chronic inflammation, destruction of the joint, excruciating pain, and inability to walk. Radical operation (resection) resulted in a cure with a useful stiff knee.

Common Infectious Diseases: Arthritis may complicate or follow any of the ordinary infectious diseases. The age of the patient, the general condition, the type of infection, etc., will frequently govern the character of the treatment to be applied. In the interim two suggestions seem of practical value: place the knee at rest with the leg extended. Apply traction, and in this way prevent deformity. Formerly pain absolutely governed the amount of artificial motion of diseased joints; in other words, movement of the joint was continued to the point where the patient complained of pain and then discontinued. Our former theories in regard to joint movement have recently been somewhat upset, as will be emphasized later in this review.

Syphilis: Syphilitic involvement of joint surfaces is much more common than hitherto believed in both the so-called inherited and the acquired types of the disease. Ostitis, periostitis, arthritis, osteomyelitis, and many other osseous and articular lesions may owe their origin to luetic infection. In not a few instances syphilis is unsuspected or unrecognized as a causative factor the patients being treated for joint tuberculosis. The most prominent symptoms are joint pain and limitation of motion. The Wassermann reaction is negative in more than fifty per cent. of cases.

In the order of frequency the joints implicated are: ankle (and feet), wrist, hip, elbow and knee. Unlike tuberculosis joint disease due to syphilis is more likely to be multiple than single. While the roentgen ray is a valuable diagnostic aid differential diagnosis between syphilis and tuberculosis cannot always be made. "There is no reliable test for joint syphilis. The Wassermann test, the roentgen ray, the clinical course, the history, must all be considered, and then we are not certain about a diagnosis."

In the treatment of joint syphilis administration of the arsenical preparations followed by small doses of mercury at short intervals, is usually productive of early improvement. The foot should be placed at rest in the meantime.

Traumatism: It would be impossible in this paper to specifically consider the multitude of traumatic agencies which may be responsible for the production of septic arthritis. Willems has done some most commendable work during the recent war in the treatment of purulent arthritis by wide arthrotomy followed by immediate active mobilization. Many other surgeons have also employed his method of treatment in suitable cases with results most encouraging. The following items of technique are abstracted from one of his recent papers.

In purulent arthritis we must first execute an arthrotomy and leave the wound largely open. The expression "immediate active mobilization" must be taken in its literal sense. The mobilization must be active, i. e., made by the patient himself by muscular contractions. The movements ought to reproduce the essential normal motions, that is extension, flexion and rotation. The goal sought to be reached is restoration of physiological function of the articulation so far as may be possible, and in case of the knee this function is walking. Active mobilization cannot be replaced by passive mobilization which does not call into play the muscles of the limb or its nutrition and which tends to restore mobility alone. Mobilization must be immediate, i. e., commenced as soon as the patient awakens from the anesthetic. The patient must not be permitted to rest. The movement must be pushed to the maximum in every direction and be continued, so to speak, uninterruptedly. He needs supervision by someone who is thoroughly familiar with the necessities of the treatment. Active mobilization is not painful in the true sense of the term; it becomes more or less easy according to the extent of the lesions, the courage of the patient and his aptitude in directing his efforts to the muscles which must be contracted, and not wasting his strength in contracting other muscles than those necessary; movements become easy according as they are repeated.

The following conclusions in regard to the Willems method of treatment seem justified:

(1) All surgical methods of draining the knee joint in suppurative arthritis have certain drawbacks:

(2) The Willems method in suppurative arthritis produces free drainage of pus, promotes circulation of synovial fluid with maximum power of resistance, and stimulates blood supply to the joint:

(3) The practical requirements of treatment are: (a) free drainage, and (b) active movement:

(4) Reports have shown that in about fifty per cent. of the cases treated a useful mobile joint has been obtained:

(5) The Willems method should not be employed if delayed until the fulminating stage of suppurative arthritis has been reached:

In my opinion the Willems method of treatment is indicated only in purulent arthritis when the patient is seen in the early stages, i. e., within the first ten days. Delayed treatment will certainly be productive of disastrous results. This class of cases may become extremely serious even when thorough and continuous drainage has been established. Fortunately in civil practice purulent arthritis occurs with comparative infrequency.

Deformity, stiffness and pain sometimes follow in all types of knee joint infection. The usual resulting deformities are: flexion and subluxation which can usually be corrected by forcible stretching, traction, the application of heat, massage, passive and active motion, in the order named. A light convalescent brace is usually indicated. I cannot too strongly emphasize the benefit to be derived from the application of heat, followed by intelligent massage employed at frequent intervals. Contrast baths, so termed by Jones, cause rapid contraction and dilatation of the small bloodvessels, and when followed by massage and active motion constitute a most efficacious procedure.

Gill admits that the diagnosis of septic arthritis of the knee following gunshot wounds is often difficult, especially where there are septic wounds in other situations. The diagnosis rests upon: (a) rising temperature, (b) high pulse rate, (c) increase in joint distension, and (d) aspiration and examination of fluid should always be practiced before operation. A favorable prognosis in gunshot wounds of the knee depends upon: (a) early immobilization and rest, (b) early removal of shell fragments within the joint.

Cofield says the results achieved in the recent war, in treating infected wounds of the knee by disinfection and immediate closure, have been the source of much surprise and satisfaction. The following conditions, however, are necessary to obtain favorable results:

(1) Operation must be performed early before spread of infection and disorganization of joint structures have occurred:

(2) Thorough lavage of infected and contaminated areas followed by primary closure of the joint capsule is essential:

(3) Foreign bodies must not be allowed to remain within the joint cavity:

(4) When the drainage is used it should extend to the capsule but not into the joint cavity:

(5) Immobilization of the joint must be secured by adequate mechanical fixation.

It is important that the diagnosis of suppurative arthritis be made early. Every joint showing evidence of inflammation and effusion should be aspirated for diagnostic purposes, and the aspirated fluid examined cytologically as well as bacteriologically.

The author makes an incision one and a half to two inches long parallel to the inner or outer border of the patella extending into the joint cavity, which is then thoroughly flushed for fifteen or twenty minutes with 1:15,000 mercuric chloride solution, using a gravity syringe with rubber tip. The objects sought to be attained by arthrotomy and irrigation of the joint cavity are:

(1) Relief of the intra-articular tension:

(2) Removal of necrotic material which acts as a culture medium within the joint cavity:

(3) The cleansing and disinfecting action on the synovia which aids it materially in regaining normal function and renewing its fight against injection.

The capsule is closed with catgut sutures and if a drain is used it is placed outside the synovial membrane to take care of the extra-capsular infection. The wound is closed in layers and the joint immobilized preferably by plaster of Paris spica. Massage, application of heat, active and passive motion often hasten recovery. Periarticular adhesions are separated by manipulations under anesthesia. Intra-articular adhesions are gradually corrected by suitable mechanical appliances.

Monsarret reviews thirty-eight cases of infected wounds of the knee joint. Of twenty-five patients treated within four days after injury, eighteen recovered without amputation; four recovered after amputation; three died; recovery of seventy-two per cent. without amputation. Of thirteen admitted the fifth day or later, four recovered without amputation; three after amputation; six died; recovery of thirty per cent. without amputation. Of twenty-five surviving without amputation, joint function was preserved in thirteen, i. e., there was a greater or lesser range of voluntary motion. Of these three were admitted the day following the wound, four the second day; five the third day; and one the seventh day. These figures indicate the urgency of early operative treatment in infected knee joint wounds.

In early infections which have not disorganized the joint, the following operative treatment is indorsed by Monsarret: (a) excision of the wound (or wounds) including those of the capsular and synovial membrane, (b) evacuation of effusion, (c) removal of foreign bodies and detached bone fragments, (d) transverse incision into the joint above the patella, (e) either no sutures or catgut suture of the excised wounds passing through synovial membrane only—no drainage material entering the joint, (f) fixation with extension and elevation of of limb to angle of forty-five degrees at hip joint.

When the joint injury is complicated by fracture primary resection may be entertained if stability of the joint is otherwise doubtful. When patients subjected to arthrotomy continue to exhibit signs of active infection secondary amputation should be considered; no lesser procedure is likely to be successful; delay in amputating beyond the third day is likely to be dangerous. Amputation is advisable if the joint infection is complicated by serious bone injury, also if the joint damage is complicated by injury to the femoral or popliteal artery, or by section of internal or external popliteal nerves.

Mouchet and Pamart have been able to follow and observe the functional results in fifty-four cases of arthrotomy of the knee. Six gave excellent results; fifteen were very good, i. e., complete extension, and flexion reaching ninety per cent.; fourteen were fair, flexion being less than right angle and extension not equal to normal; nineteen were poor. Their statistics, therefore, show thirty-nine per cent. of good results; twenty-five per cent. fair; thirty-five per cent. incomplete with more or less ankylosis.

Churchman advocates treating septic arthritis of the knee joint by lavage of joint cavity and staining with gentian violet. In one case joint infection complicated compound comminuted patellar fracture; when the patient was admitted twenty days after injury purulent arthritis (staphylococcus aureus) had developed. Treatment was instituted according to the method mentioned, and the author remarks: "The result, however, was a complete cure of the septic arthritis; and we were subsequently able to suture the fractured patells—which healed by first intention as though no infection had previously been present—and finally to give the patient a normal leg."

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FOREIGN BODIES IN THE EAR AND AIR PASSAGES.

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The presence of foreign bodies in the eye, ear, nose and throat gives rise to experiences which are not always pleasant to the busy doctor, but which are often encountered by him. The majority of these foreign body cases are seen first by the family physician and, as it is not always desirable and may even be impossible for him to refer to the specialist, it becomes necessary for him to assume the management of them. As these cases often occasion a great deal of alarm in the patients and their solicitous friends and relatives, the doctor's method of treating them will reflect a great deal of credit upon him if they are properly managed or, if his efforts to give relief result in failure, they may bring him some unpleasant notoriety. The expenditure of a small amount of money for equipment and a moderate degree of experience in its use will enable the general practitioner to care for the majority of these cases as successfully as could the specialist.

During the summer months it is not unusual to find insects lodged in the auditory canal. This accident, though not dangerous as a rule, causes the patient a great deal of distress from the sensation produced by the insect's changing positions. I have never seen any real harm ensue from the presence of an insect in the ear except in a case in which an ixode or "dog tick" had fastened itself upon the drum membrane, setting up a painful myringitis which lasted ten days or more. Insects are very easily removed by first instiling a five per cent. solution of chloroform in glycerine into the ear. This anesthetizes the intruder, after which its removal by syringing with warm water is easily accomplished.

Frequently children push foreign substances into the ears and their removal is not always an easy matter, especially if the child is intractable. By directing a stream of water into the ear, the foreign body can usually be washed out. This should not be used if the substance is a cotton seed or bean, for should the first attempt be unsuccessful, the bean or seed will swell, entirely filling the canal. In these cases a speculum should be inserted and a lacrimal probe, bent so as to form a small hook, should be gently pushed past the intruding particle, then turned so as to engage it, after which it is drawn out, bringing the foreign body with it. I have used this method in several cases, always with the desired result. There was sent to me not long ago a boy twelve years old who had pushed a pebble into his ear for the purpose of relieving an earache. The stone completely filled the lumen of the canal, which was greatly swollen and was bleeding from unsuccessful attempts at removal, and it was only after a half hour of persistence and persuasion that I succeeded in getting past it a No. 1 Bowman's probe, previously bent. In turning the improvised hook, a twinge of pain caused the patient to jerk his head away, which resutled in the removal of the pebble. In this case a mastoid inflammation would have resulted if the pebble had not been removed when it was, as a previous suppurative condition of the ear existed.

In cases where foreign bodies could not be grasped by forceps or where the lumen of the canal was entirely filled, preventing the insertion of a hook behind them, they have been removed in this very ingenious manner: A speculum was inserted and a match previously dipped in glue which is just about to "set," is placed against the foreign body and allowed to rest on the speculum for several minutes. It is then withdrawn, bringing the foreign body with it. This is applicable only to cases in which the canal and foreign body are dry. Manipulations in the ear should be very gently performed and should be attempted only under a reflected light. Care should be taken not to wound the membrana tympani by the instrument used or to rupture it by pushing the foreign substance against it.

Cases of foreign bodies in the nose are of frequent occurrence but fortunately their presence causes the patient more inconvenience and annoyance than immediate danger. If their removal is delayed too long, however, a suppurative condition from erosion of opposing surfaces is apt to be set up, which may extend to the sinuses or the infection may follow up the eustachian tubes and invade the tympanic cavity. These cases are usually found in children whose faculty for experimentation is great. I have seen only two cases in adults, one being in a hysterical girl, the foreign substance being placed in the nose presumably to excite notice which would occasion the sympathy of a relative. Their removal is simple. The child should be placed in the lap of an assistant who is strong enough to overcome its struggles. A speculum should be introduced and with a reflected light, the substance should be located and grasped with forceps if possible. Buttons and similar substances are not readily engaged by the forceps. In these cases, a small hook can be passed over the foreign body and it can them be readily drawn out. Some surgeons advocate pushing the foreign body back into the throat, but efforts to do this frequently wedge it under the turbinals and, should it be pushed back, there is danger of its dropping into the larynx.

In this climate it is not unusual for the nose to be invaded with maggots or "screw worms." This is a grave condition and one which calls for immediate and radical treatment, as a number of deaths have occurred in neglected cases. They may be confined to one side or may be generally distributed throughout the fleshy portion of the nose and may even invade the sinuses. The diagnosis is easy, as the parasites are blown from the nose during the patient's frantic efforts to obtain relief. The treatment which, if applied in time, is specific, consists of ten per cent. chloroform in alcohol, syringed into the nose. This should be done hourly until all evidence of the existence of maggots disappears.

There is no more distressing condition nor one which calls for more prompt or heroic treatment than that of the foreign body in the larynx, trachea or bronchus. The size of the offending substance seems not to influence materially the distress of the patient. A small body moving back and forth in a bronchus may cause the most violent respiratory spasms. The patient's appearance is usually an alarming one. He struggles for breath, the face is livid and the eyes bulge from their sockets. The patient either dies immediately or the anesthesia from suffocation relaxes the spasm which recurs after a short period. The foreign body may sometimes be removed with the finger. If it happens to be in the larynx, pounding the patient on the back may help him in his efforts at expulsion. Shaking him violently with his head downward may be tried. The physician must not be too persistent in these attempts, and some kind of an opening in the larynx or trachea must be made as soon as possible to preserve the patient's life. The larynx is easily gotten into and the rudest operation is preferable to a dead patient. If there is no relief from a laryngotomy a tracheotomy should be performed.

DANGERS, FAILURES AND DIFFICULTIES IN FOREIGN BODY BRONCHOSCOPY; A NEW INSTRUMENT FOR THEIR ELIMINATION.

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Failures in bronchoscopy for foreign bodies may arise from one or a combination of the following reasons:

1. Inexperience in the use of the required instruments.

2. Lack of mechanical skill and ability, and of familiarity with the appearance and anatomy of the bronchial tree, as seen through a tube.

3. Failure to take the time before the attempt, to ascertain, as far as possible, the size and nature of the body to be removed, its exact location, and the length of time of its existence in the bronchus or elsewhere.

4. The difficulty in trying to see through a tube with a lumen necessarily small, with a forceps carrier wobbling about within it.

5. Both hands are necessarily employed with the instruments which are now available, one to hold the tube, the other to manipulate the forceps. This requires harmonious action, which necessitates much practice.

6. After entering the trachea or bronchi with the forceps which we have selected, we often find that it will not grasp the object; we then withdraw it to hunt for another to make the attempt. This requires time and thus often jeopardizes the life of the patient.

7. If a tube is used with the light within at the distal end, this light often becomes obscured by mucus, blood, etc., or the forceps carrier covering it and darkening the field. If a tube is used with the light reflected from without, at the proximal end, this is not only cumbersome, but we are working all the time between the light and the foreign body to be removed, thus constantly darkening the field of work by shadows.

8. Pushing the object further down the bronchi, due to the failure of the forceps to successfully pass the object, because lack of room between it and the bronchial wall; or the operator, after repeated failures, growing desperate, begins to blindly, fish and grab, hoping by some miraculous way to obtain success, other than through patience and skill.

9. Crushing the objects, leaving particles too small to be removed, to set up inflammation. This is quite a frequent occurrence in cases of foreign objects, of vegetable composition, such as the peanut, beans, etc.

I believe the above named causes of failures constitute the principal ones. The first three can be remedied by practice and patience for they lie altogether within the individual efforts of the operator alone. The rest of the difficulties in a great measure, are practically eliminated, at least in the majority of cases, in the instrument herein described. It presents the following features:

1. A combined bronchoscope and forceps so constructed that it will grasp practically any object of any shape and any size that may find its way into the trachea or bronchi, doing away, in the majority of cases, with the use of forceps of many and various shapes and sizes, which are used through the barrel.

2. Vision is had at all times, whether the forceps is closed, being opened or open, as there is no instrumentation through the barrel.

3. There can be no shadows cast upon the object on the field of operation or within the barrel.

4. It will grasp and hold almost any object, whether hard and round like a glass ball, or a soft substance like the peanut, for it does not depend upon the same principle as other forceps. It has only one thin jaw which passes over the object, and closes up the tube behind and, by its life-like motion, it works objects up to the barrel and, if small enough, into the barrel.

5. It is easy to tell when arriving at the object to be removed, as the forcep can be lifted up and down by the trigger-like motion of the index finger and the body thus seen to move. In other words, we feel our way.

6. There is much less danger of driving the foreign body further down into the deeper bronchi, as there is only one thin forceps blade, instead of two, to pass the object, and it is parallel to the wall of the bronchus.

7. Impacted bodies can be worked loose and the process watched while it is being done, by a simple up and down motion of the forceps blades without

disturbing the relation of the forceps blade to the end of the barrel or the object.

8. If secretions too thick and tenaceous to be drawn through the suction tube get in the way obscuring the view, they may be pushed aside with the forceps blade.

9. Abscesses with small openings into the lumen of the trachea or bronchi may be opened and enlarged, allowing pent up secretions to escape.

10. While the bronchoscope is being withdrawn, with the foreign body within its grasp, it can be seen whether or not it remains within the grasp until fully withdrawn. This is not possible with the forceps which have to be used through the barrel. Often a foreign body has been lost during the withdrawal.

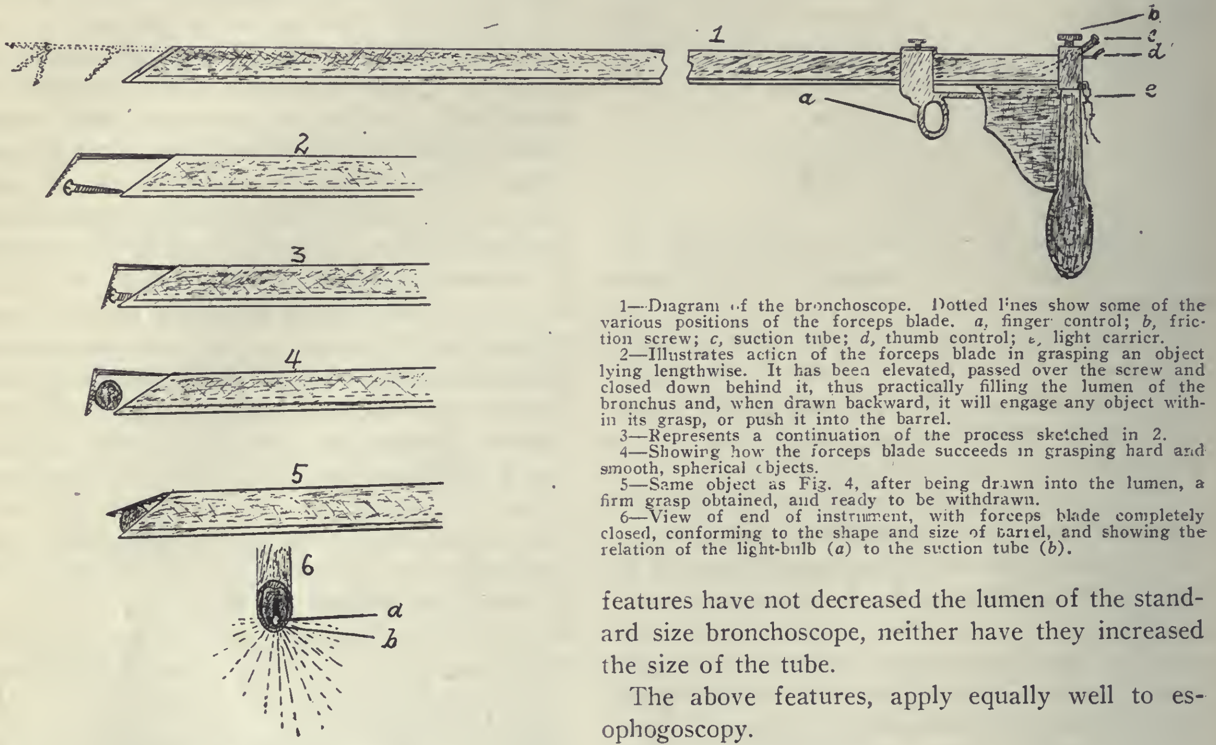
11. By regulating the friction control screw at the head, just sufficient tension can be obtained, not to crush soft bodies of vegetable composition, such as peanuts and beans. I consider this one of the most valuable features. An extra strong grasp can be obtained by the process being reversed. This feature can also be controlled by the thumb control, without disturbing the screw.

12. Granulating tissue can be curetted away where the object has become embedded in it. The shape and size of the forceps together with its double motion makes it an excellent curette, when needed, and it is always there, ready.

13. Unless the secretions are exceptionally thick and tenaceous, it is impossible to obscure the light, due to the mechanical arrangement of the light and the drainage tube. The opening of the drainage tube into the barrel is in front and at the apex of the light bulb, and the secretion is taken up before it reaches the light. Every part of the tube can be instantly taken apart for cleaning and sterilization.

14. It requires only one hand to operate.

15. If occasion should arise where the operator should choose to use forceps or hooks, they can be employed in the usual way, as the above added features have not decreased the lumen of the standard size bronchoscope, neither have they increased the size of the tube.



1—Diagram of the bronchoscope. Dotted lines show some of the various positions of the forceps blade. *a*, finger control; *b*, friction screw; *c*, suction tube; *d*, thumb control; *e*, light carrier.
2—Illustrates action of the forceps blade in grasping an object lying lengthwise. It has been elevated, passed over the screw and closed down behind it, thus practically filling the lumen of the bronchus and, when drawn backward, it will engage any object within its grasp, or push it into the barrel.
3—Represents a continuation of the process sketched in 2.
4—Showing how the forceps blade succeeds in grasping hard and smooth, spherical objects.
5—Same object as Fig. 4, after being drawn into the lumen, a firm grasp obtained, and ready to be withdrawn.
6—View of end of instrument, with forceps blade completely closed, conforming to the shape and size of barrel, and showing the relation of the light-bulb (*a*) to the suction tube (*b*).

The above features, apply equally well to esophagoscopy.

522 Games Building.

Hints to Writers

Many a diffuse and ineffective speaker is a concise and effective writer. One means of attaining that desirable result may be described. When the subject is selected, write or dictate everything that may be in the mind or that may occur as pertinent to it. Then do three things. First, select a definite title or a clear definite text. Write it in clear large words; set it up before you on your desk; take your paper, a good blue pencil and mercilessly cut out everything that does not conform with the text. Ability to "follow the text" is one of the highest attributes of the human mind. Second, go over the various paragraphs that remain and arrange them in logical order. Third, go over what is then left and study each important word and select synonyms that will best express the thought in your mind.—*N. Y. State Journal of Medicine.*

THE OPERATIVE TREATMENT OF THE TOXEMIAS OF PREGNANCY.

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It is not my purpose to enter into a discussion of the ethics of therapeutic abortion, but it will not be amiss to restate some pertinent facts in connection therewith. It is an unquestioned biologic fact that life exists from the time of conception, which will in time, if nothing adverse intervenes, result in a child born with the inalienable rights of a human being. This being so, anyone who interferes with the life of a fetus in utero assumes a tremendous responsibility. He assumes the rôles of all the officials of a court—prosecuting attorney, jury, judge and executioner, and no one individual is wise enough to take the entire responsibility.

Before resorting to therapeutic abortion for the toxemia of early pregnancy, the rights of the unborn child should be considered just as sacredly as the rights of the mother. There is no excuse, nor is it within the realm of reason, to advise or perform a therapeutic abortion without a thorough scientific study of the case with able and conscientious consultants. If it is so evident, without study, that the case is one that demands the operation, the chances are that the operation will not avail in saving the life of the woman. Fortunately the cases are rare which demand this procedure and they are becoming progressively less and less frequent. This, I believe, is the result of a number of factors; women are placing themselves under the care of their medical advisers much earlier in their pregnancies than formerly; the physician more fully realizes his responsibilities and has discarded the plan of watchful waiting for one of preparedness; the rights of the unborn child are better understood and appreciated; social service and prenatal work have been and are tremendous powers for the better care of the pregnant woman—and better care means early recognition of impending danger and consequently early treatment to forestall the disaster.

Very few cases of toxemia if recognized early, with prompt and efficient treatment, will reach a condition requiring therapeutic abortion. I venture the assertion that when the time comes that all women will be under medical supervision from the beginning of their pregnancy, this will be one of the rarest operations in obstetrics. Women of the better class are being educated rapidly to the need and advisability of early medical supervision of their pregnancy. Unfortunately the majority of expectant mothers are not in a position financially or intellectually to obtain this ideal. The only way in which they can be effectually reached is by intelligent social service in connection with pre-natal clinics.

It is the prime duty of all men and women engaged in obstetric activities to give this aim their most earnest support and encouragement. I trust that the time is not far off when it will be regarded as a badge of inefficiency for any man in charge of the obstetric department of a hospital, not to have in connection therewith a well-organized prenatal clinic.

It may have been noted in speaking of emptying the uterus for toxemia of early pregnancy that the term "therapeutic abortion" has been invariably used. It seems hardly necessary to dignify any other method by discussing it. The only possible excuse for performing an abdominal section in these cases would be the need of rapidly emptying the uterus. The primary risk of the operation is much greater and the danger in future child-bearing is incalculable. I would not mention this subject were it not for the fact that there is a growing tendency for the general surgeon to invade the field of obstetrics. I have no quarrel with the surgeon doing obstetrics, providing he is an obstetrician. It should be remembered, however, that only a very minor part of the obstetric art consists of surgery. Any man well trained in surgery can probably perform the few operations required in obstetrics, just as well as the trained obstetrician but this ability does not make him an obstetrician. I am reliably informed that in several hospitals in Philadelphia the obstetricians on service are mere midwives; they are permitted to attend only the normal cases, and all cases requiring any surgical procedure must be referred to the surgical staff. This includes anything from a lacerated perineum to Cesarean section. Such an arrangement of course is inimical to the best interests of the hospital, medical education and the advancement and dissemination of obstetric science.

A discussion of the surgical treatment of the toxemia of pregnancy can hardly be separated from a discussion of the treatment as a whole. I believe that while surgery still has a place in the treatment of toxemia, it is a comparatively small one. There is sufficient evidence at hand to prove that the most rapid emptying of the uterus possible, in every case of convulsions, is not justified. Theoretically all and practically most cases of toxemia are cured as the result of the termination of pregnancy. It is equally a well known fact that the toxemia does not immediately and miraculously end with the termination of pregnancy. Many of them apparently do but it is not because the uterus is emptied, but because that most efficacious method of elimination, "blood letting" has been practiced at the same time.

My personal feeling is that any case of toxemia is benefited by removing the cause of the toxemia, namely the fetus. The time and method of accomplishing this cannot be solved by laying down hard and fast rules but must be solved by meeting the indications in the individual case and by applying the measures which will best meet the indications. In a general way it must be realized that a toxemic woman is not a good surgical risk and nothing should be done to add jeopardy to the case by ill-advised surgery. A good rule to follow is to make haste slowly.

I am firmly of the opinion that the universal application of Cesarean section in the treatment of these cases is unjustified. Cesarean section has an important place in the treatment but not a very wide one. We must not lose sight of the fact that active elimination treatment with the method of Stroganov has given far better results than any other treatment. Emptying of the uterus by the means which exposes the woman to the least danger is an important adjunct to the treatment; simple rupture of the membranes with the induction of labor will meet this indication in the majority of cases. If this is true what can justify the universal application of Cesarean section? My feeling is that Cesarean section is applicable only when this promises to be the least dangerous method to the woman in the individual case or in those cases of fulminant toxemia when immediate emptying of the uterus can be tried as a "dernier resort." Cesarean section carries with it a mortality even in the best selected cases, with an augmented one in the poorer surgical risks such as toxemia, and in the dangers of rapid and unsatisfactory preparation of the patient for operation. Again we must not lose sight of the fact that once a toxemic woman does not mean always a toxemic woman; but that once a Cesareanized woman does mean always a Cesareanized woman. The last statement is not to be accepted literally but is said in this way simply to emphasize the fact that a Cesarean section does add a definite and very serious danger to the woman in subsequent pregnancies. The scar will no doubt stand the strain of subsequent pregnancies and labor in the majority of cases but the case reports of rupture of the uterus at the line of scar are common enough to make us realize that this operation should not be performed unless there is a definite indication for it. A thorough knowledge of the obstetric art and science is necessary before one can adequately recognize the indications.

Vaginal Cesarean section, at one time much in vogue, has a limited field in the surgery of toxemia of pregnancy. In the multiparous woman until the seventh month of pregnancy it is probably a safer operation than abdominal section. In the primiparous woman and in the woman beyond the seventh month, however, the technical difficulties and the time consumed in the performance of it makes it an unsatisfactory procedure.

Pubiotomy and symphyseotomy as operations of choice have no place in the treatment of this condition. Decapsulation of the kidneys has been advocated but the suggestion is too bizarre to receive serious consideration.

Forceps delivery and extraction by version are used only to meet the indications which necessitate their use in the ordinary cases of labor independent of eclampsia or as a means of terminating labor quickly providing they do not add undue risk to the woman. There is nothing to be gained by saving an hour in the labor and spending an hour repairing the traumatism occasioned and subjecting the woman to the added danger of wound infection.

I take it that it is not necessary to discuss the fact that craniotomy on the living child is not a justifiable operation in the treatment of the toxemia of late pregnancy.

113 South Twentieth Street.

Tradition in Medicine.

We are reminded of the many statements in medical works having little or no foundation in fact, but which are accepted as gospel truth and handed down without investigation from one writer to another. What, and how many, these statements are, especially with regard to therapeutic practices, heaven only knows and we would dread to have disclosed all at once. Disclosed they will be in time, but that time seems needlessly slow and long drawn out. If medical authors could somehow be held responsible for their statements the casting out of dead and harmful timber from their works would be accelerated. As it is, the amount of matter that bears the stamp of the author's own experience, and therefore originality, is, in most books, and must be in any large work, exceeding small. The great bulk of his matter is a repetition of what has stood, possibly for centuries, unexamined, for truth.—*N. Y. Medical Journal.*

GOLDEN RULES IN ABDOMINAL SURGERY

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The diagnosis of abdominal surgical affections is at best the accomplishment of one skilled in the interpretation of medical and surgical physical signs and symptoms, and when there is added to this an understanding of surgical pathology, it at once becomes apparent that such diagnostic skill is not the possession of the mere novice or the occasional operator. We emphasize these requirements, not that they are unessential in surgery in other regions, but especially because abdominal surgery is surrounded by many pitfalls into which the unwary may find that his endeavors, instead of leading to a pinnacle, are unconsciously drifting him toward the edge of a precipice.

When one has the classical, cardinal symptoms as guiding posts and the symptomatology conforms with the printed page of the text-book, the diagnosis becomes a matter of routine; but alas! too often the inroads of disease follow no definite, logical course and it is here where the skill of the diagnostician asserts itself. And all too frequently, let it be remarked, from lack of a proper understanding of this important region of the body, many untimely and unnecessary operations are performed, augmenting without any reason whatsoever, a formidable array of mortality statistics.

Besides the physical signs, the surgeon has resort to instrumental aids, the roentgen rays, laboratory methods, etc., and while the various rays, illuminants, the microscope, etc., are regarded as courts of last resort, it is the peculiar experience of most surgeons that too much dependence must not be placed upon these so-called irrefutable proofs that often, instead of acting as corollaries to the surgeon's interpretation, offer themselves as snares and delusions. I recall one instance where a number of shadowgraphs in the hands of an excellent roentgenologist were interpreted as those of a series of gall stones, and subsequent operation failed to reveal any such condition. Again, the microscope is by no means an infallible diagnostic aid, and while every means should be employed to strengthen the diagnosis, absolute dependence should not be placed upon those refinements as indisputable authority.

I wish also to call attention to the unnecessary and often dangerous delay occasioned by this or that physician or specialist, examining this or that secretion, making a special or detailed study of the symptoms, or postponing the patient's entrance into the hospital or delaying seeking the surgeon's opinion at the patient's home until much valuable time is lost. Such delay not infrequently conduces to a fatal termination. Let the surgeon study the case at the earliest possible moment. Unlike many others, when in doubt, instead of consuming valuable time, unraveling what may baffle the diagnostician, I recommend an exploratory incision, as the quickest and safest procedure. Let it be remembered that the "educated" finger is to the surgeon quite as important as the trained eye or the gifted mind, for the deft and skilled touch can often reveal to the operator what would ordinarily require much cutting, unnecessary hemorrhage, perhaps shock and disarrangement of the viscera. As was previously remarked, the most painstaking tests and examinations often fail too reveal the true condition that the surgeon encounters; therefore, it behooves the surgeon to be reasonably sure of being able to meet any of these serious conditions in this complex cavity. It is a part of wisdom to have at hand a variety of instruments adaptable to different operations; thus, the gastro-enterostomy armamentarium should be in close proximity, for while the ingenious surgeon may form his clamps by the employment of wooden tongue depressors, the use of such emergency devices is not to be encouraged.

To revert again for the moment to delay in these important surgical cases, too often the condition is complicated by a peritonitis, masking the primary affection and making the prognosis extremely grave. It would be a cruel interrogation to force a confession from the attending physician, but not rarely are we informed that the patient has been thoroughly purged, which has resulted in encouraging a diffusion of the peritonitis. It seems almost superfluous to caution against the use of morphia or other opiate for the relief of pain, thus effacing the sensitive area and in that way obscuring the diagnosis.

It is an incontrovertible axiom that the unmistakable and readily arrived-at diagnosis of serious affections in the abdominal cavity is of bad omen, and the reason is not far to seek. For any disease, especially the stealthy inroads of malignancy, asserts its fatal import when the skill of the therapeutist no longer avails and surgical intervention only hastens the oncoming of the final issue. Epigrammatically, the statement is happily put, "In the earlier stages of surgical lesions the diagnosis is the major part of the surgery; the operation is minor. In the later stages of the surgical disease, the diagnosis becomes the minor part, operative surgery, the major, and the results, both immediate and permanent, are worse."

Of course, the surgeon is often at a disadvantage in not seeing the disease at any early stage. Necessarily the history of the patient and the progress of the malady are to him as a closed book. He needs employ his best judgment, which at times, though emanating from one who is both an operator and a surgical philosopher, may, nevertheless, be faulty. Resort must necessarily be made to laboratory methods, but these are not, as previously stated, to be regarded at all times as infallible proof. The Wassermann test for syphilis is often the sole means of arriving at what appears to be an impossible diagnosis; where the mecurials, iodides, salvarsan and other medicaments stay the hand of the surgeon and are successful in effecting a cure. Tuberculin tests and tests for tuberculosis are invaluable.

The urinary examination is important for the discovery among other things, of kidney function, diacetic acid and acetone; the presence of these substances, in the absence of diabetes and of kidney disease, indicates that the patient's nutrition is below par and that his system needs rehabilitation, when possible, before operation.

A complete blood count with a differential count of the leucocytes, should always be a preliminary step to operation. It must not be forgotten, however, that at times even a high leucocytosis fails to show the presence of pus. Skilled surgeons are prone to regard the existence of pus rather by the tactile sense than by the differentiation of the hemotologist.

The roentgenogram is an adjunct of special value to the operator; but this serious criticism has been justly made—that to be of value, the *x*-ray plate and its interpretation, and the pathological condition found at the seat of operation, should be searchingly compared; that the roentgenologist seldom sees the operation, and the surgeon performing the operation, as a rule, only indifferently regards the *x*-ray picture; and that both are making unnecessary mistakes by neglecting the observations of the other.

The routine examination of the feces is usually neglected. Its importance at once becomes apparent in consideration of parasites to explain the presence of anemia, the existence of free blood, the presence or absence of bile, etc.

Nor are these all. The surgeon who would excell in abdominal work must be a good physician as well. The surgeon who is a good diagnostician on abdominal diseases must be a good diagnostician of other regions of the body. Were the errors in diagnosis listed, wherein medical entities and even those in remoter parts of the body were mistaken for abdominal affections of a surgical nature, they would form an imposing chapter in the annals of unfortunate surgery. In illustration of this we quote the following from an interesting paper by Riesman.* "I was asked," he writes, "by a surgeon to see a man upon whom he intended to operate for cancer of the stomach. The chief symptoms were anorexia, vomiting, a painful epigastric tumor and great prostration. Examination revealed, it is true, a pronounced fullness of the epigastrium and the sensation of a mass, but more careful exploration showed that this was the left lobe of the liver, the enlargement of which was found to be due to mitral stenosis."

The same author makes mention of an old, alcoholic, kyphotic patient,** who suffered severe pain in the right epigastric region, and where the existence of a peritonitis was strongly suspected. The case was so much involved and the diagnosis so doubtful that an operation was not regarded by surgeons as justifiable. At autopsy an abscess was found, underlying the liver; the source of this abscess at first was undiscoverable, but after careful dissection it was found connected with the outbreaking of the old tuberculous focus of infection.

The number of pitfalls for the unwary in the domain of abdominal surgery is legion. Space will permit of reference to three major affections that are all too frequently confused from a diagnostic standpoint and whose true nature is at times only to be found at the operation table; we cite, appendicitis of the acute variety, cholelithiasis, and ulcer of the stomach.

Taking the second of these first, namely, gallstone disease, we have (although not, as a rule, so regarded) a protean malady that manifests itself in a dozen different ways, eleven of the twelve times of these manifestations often being diagnosed as a widely different affection. It is not uncommon for a surgeon to be gravely in doubt at the physician's diagnosis of cholelithiasis. Often the surgeon calls upon the medical practitioner to corroborate the surgical diagnosis. Frequently they concur in their opinions and both are in error. The pains in gallstones are not infrequently found upon the left side, and in those cases are usually caused by adhesions. So often is cholelithiasis diagnosed as "chronic dyspepsia," "nervous indigestion," and gastralgia, that there are not a few intelligent physicians who assert

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*David Riesman, *Pennsylvania Medical Journal,* August, 1914.
**Ibid.

that ulcer of the stomach is a sequence, and in some instances a patient is hurriedly rushed to a hospital with a "stomachic perforation," because the victim is in a state of collapse; it should be remembered that there is less shock in biliary colic and the liver dullness is not obliterated.

A high position of the appendix makes the differentiation, at times, between appendicitis and gallstone disease, a task of nice appreciation. In appendicitis, however, the point of tenderness is a little lower than in cholelithiasis. Rigidity of the right rectus muscle, or, for that matter, of both recti, is not pathonogmonic of any particular abdominal affection; rather do many surgeons attach importance to the high leucocytosis. The differentiation between these two conditions on the one hand, and gastric or duodenal ulcer on the other, especially when the gastric ulcer is situated upon the posterior wall of the stomach, with absence of hematemesis, is often a matter of extreme difficulty. In the presence of classical symptoms, i. e., pain immediately after the ingestion of food, vomiting and hemorrhage, the diagnosis offers no difficulty, for gastric hemorrhage means just one of three conditions: gastric ulcer, gastric cancer, or hepatic cirrhosis.

The object of this brief communication, at the outset, was simply to record some of the guiding points that are indispensable in a study of abdominal conditions, and the avenues of approach, that are endorsed by some of the best thinkers in this field of endeavor. The few words added in relation to a disease or two, are introduced rather as illustrations than as discourses on the differentiation of these important maladies. Were the paper at all discursive, we would inscribe a manuscript of almost impossible proportions, for such a paper would offer discussion of such surgical subjects as diseases of the pancreas and the spleen, chronic intestinal obstruction, typhoid perforation, gynecological affections, etc. In conclusion, the desirability of *early* study of these cases by the surgeon cannot be overemphasized.

218 South Fifteenth Street.

Infarct of the Spleen.

Infarct of the spleen should be suspected when in the presence of infection or following an accident or violent exercise there is sudden sharp pain referred to the point of the left shoulder, with tenderness on deep palpation of the splenic region. This with an enlarged and palpable spleen makes the diagnosis reasonably certain.—John B. Deaver in the *N. Y. Medical Journal.*

A PLEA FOR MORE SIMPLE TECHNIQUE IN HERNIOPLASTY.

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Probably never before in the same period of time have so many hernioplasties been performed as during the World War. In proportion to the large number of operations for the condition there have been brought forth numerous modifications of well known procedures. We certainly were not wanting in variety of procedures for hernioplasty which had been established by earnest workers. I do not deprecate originality; it is the essence of progress. I admire the heretic but I am unable to see real progress in multiplicity of procedures with only minor differences of technique to the great confusion of beginners. I welcome all modifications of surgical technique that make for simplicity and thoroughness.

In this discussion I am not trying to put my stamp upon any new procedure, nor do I claim any step which may not have been taken by other operators. My aim is to simplify the procedure in every particular. I regret that it is not my observation that we grow more simple and eliminate unnecessary steps in our surgical procedures; indeed, it would seem quite the reverse. If I am entitled to an expression of thought which I constantly have after seeing most operations, it is that the operators are making their work too difficult through unnecessarily complicated and burdensome technique. Price was a surgical genius because he was a great master of a most simple technique.

I discuss the most usual hernia, namely, oblique inguinal hernia. The indications are two, namely, to treat the sac and to close the opening produced by the hernia. There has been too much said about the cord and too much done with it. I am sure that in over ninety per cent. of hernioplasties it is not necessary to even see the cord. I never could see the necessity of a useless dissection of structual planes and then immediately re-suturing them to their former positions and relations. Never sever a structure in order that it may be sutured; such is without surgical philosophy.

Much is said about the internal ring in most hernioplasties. It is the place at which a large per cent. of the recurrences take place; or if not at the internal ring, just external thereto. Early in my work I saw the virtue of effacing as thoroughly as possible this weak point of the internal ring and that interval just external to the ring which lies between the outer third of Poupart's ligament and the lower border of the conjoined tendon. I made this discovery by attempting to find a weak point in my surgery after suturing the conjoined tendon to Poupart's ligament. It was apparent to me when I made pressure with the end of the finger external to the location of the internal ring, that there existed a considerable space of little protection by either muscular or fascial planes; I therefore inserted a couple of re-enforcing sutures external to the location of the internal ring. I have learned subsequently to taking such step, that Dr. Ferguson has made similar observations and has written most intelligently on this weak point. I am sure he is entitled to any priority he cares to claim, but he is bigger than priorities and has given us the very best hernoplasty that adorns the text-books. I endorse his procedure in practically every particular and probably differ from him only in the treatment of the sac. The internal ring and its immediate neighborhood being the part of usual recurrence, any step to eradicate this weakness is indicated. It is for this reason I have never been able to endorse any of those procedures which bring the cord above the conjoined tendon and thus have a tendency to perpetuate the internal ring and that canal which is necessarily produced when the cord is brought through those structures for which we depend for future relief of the condition. It may be impossible to efface the internal ring as it is formed by the fascia of the transversalis muscle, but by keeping the cord below the conjoined tendon we have at least closed any canal which would naturally lead from the internal ring through the muscular planes, which canal and its immediate neighborhood are the predisposing points of recurrence.

A good deal is said about suturing of the structures near the internal ring around the cord and it is confusing to beginners as to just how snugly such suture may be placed without congesting or strangulating the cord. If the cord is not brought through and placed above the conjoined tendon as we advise, there is no need for such indefinite step. Always eliminate indefinite steps in surgery.

As I have said, in probably ninety per cent. of hernioplasties for oblique inguinal hernia, I do not even see the cord, therefore I never see a swollen testicle after the operation. As far as my memory goes at this moment, I have no recollection of any enlarged testicle following our herniotomies. In those cases in which the cord is adherent to the sac, in most instances the vas is found on the inside of the sac, other structures of the cord on the outside. Do not do unnecessary manipulation to find the extremity of the sac, but early incise it at any point and insert a finger to better define the location of sac and facilitate the dissection of structures from it. Do not attempt to assemble the structures, the cord is simply depressed into its fatty bed as the sutures are introduced in the manner described below. We ligate the sac by transfixing it at as high a point as possible, and amputate it if of any size and, after dissecting the peritoneum for at least an inch beneath the muscles of the conjoined tendon, the ligated sac is transposed and anchored one inch above the free margin of the conjoined tendon. If one simply anchor the sac by transfixing the muscle with one end of the ligature and then tie with the other or free end, one has only pulled the stump of the sac one-half the distance from the free margin of the conjoined tendon to the point of transfixion; but if both ends of the ligature have been used to transfix the muscle at a high point, one truly transposes the stump to the full distance of point of transfixion. I have felt this is important as it most thoroughly effaces that funnel-like depression which must exist after ligation of the sac and dropping it back without transposition or anchorage. If the sac has been transposed and anchored one inch above the margin of the conjoined tendon, any return of pressure at the mouth of the sac is directed against solid structures one inch above the canal.

A most necessary step in the operation is a very thorough exposure of the fibers of Poupart's ligament and the attached fibers of the incised external oblique in practically the full length of the ligament. It is important that no fatty structures intervene between the conjoined tendon and Poupart's ligament to prevent a strong union. If operators had been mindful of this principle of not permitting fatty structures to intervene between muscle and fascia in the suture of abdominal incisions, it would not have been necessary for them to have abandoned the through-and-through suture, which is the most rapid, thorough and stable of all methods of closing the abdominal cavity. I use no absorbable ligatures in any of my work; all buried ligatures or sutures are of silk. The conjoined tendon and Poupart's ligament are united by four or five silk sutures; the sutures are introduced by depressing the cord and surrounding fatty structures by the back of the finger, while a good bite of the lower fibers of the incised external oblique and all of the shelving roof of Poupart's ligament are included in the introduction of the suture. The needle is then carried over the finger which is depressing the cord and the surrounding fatty structures and is passed under the conjoined tendon including at least three-fourths of an inch of that structure.

The sutures are tied gently with just sufficient tension to approximate the structures. There should not be sufficient tension on these sutures to be harmful to the nerves if such are included. The less amount of tissue included in the bite of any suture, the more apt one is to harm the structures included. The great amount of tissue we include in our sutures uniting the conjoined tendon to Poupart's ligament and the gentle tying prevents tissue crush or injury. In our eagerness to close any opening we are inclined to tie too tightly. The lower margin of the conjoined tendon should be free of fat and the fibers sufficiently exposed to permit early and firm union to the ligament. Our sutures extend from the external ring to one or two sutures external to the location of the internal ring. The external ring is left just sufficiently patent to permit passage of the cord, possibly large enough to permit a dimpling by the end of the small finger. The operation is finished by uniting the incised fibers of the external oblique by a few interrupted sutures of silk, and the skin is closed by interrupted sutures of silkworm-gut. Interrupted sutures are drainage sutures and less apt to give trouble than the subcutaneous. There is no point in the entire procedure which demands any fine point of judgment as to technique. There are too many insanities of uncertainties in surgical teachings. Nothing can be more simple than this technique. The cord is not handled or even seen and yet it is impossible to harm it if depressed by the finger as aforesaid.

The nerves are not isolated and not harmed by including a good amount of tissue in suture inclusion and tying very gently.

The internal ring about which a great deal is said of definite technique, is not even dealt with by eliminating the canal which is made when the cord is brought through structures from the internal ring. If this operation can be made more simple, I shall be a follower of such technique.

The Workingman's Hernia.

When a hernia arises during industrial service, regardless of the etiology, we contend it should be relieved by truss, or repaired surgically, and the affected individual restored to industry. The practical economic problem arises—at whose expense should trusses be fitted, and herniotomies performed? The company's surgeon can do the herniotomy and radically cure the disease in less time than is wasted in legal quibbles over "who is responsible?"—Charles A. Lauffer in *The Journal of Industrial Hygiene.*

APPENDICITIS, HERNIA AND ANO-RECTAL DISEASES OF THE YOUNG SOLDIER.*

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One of the most astonishing revelations of the draft for the Army was the great number of the physically and mentally defective youths. Until the draft law was put into full operation comparatively little note was made of the physical and mental defects of the American youth. It was only the exigencies of war that awakened the public to the recollections of the past.

For more than a quarter of a century the U. S. Public Health Service, Anti-Tuberculosis Society, American Social Hygiene Association, U. S. Department of Labor for Child Welfare, and others, had been pursuing a vigorous campaign of education for the uplift and betterment of American children, but the American public, so interested in property and dollars, did not grasp the lesson.

It was perfectly natural for the condition not to be fully realized in time of peace because in each community only a comparatively few cases existed; whereas, when segregated by the draft, the number of seriously defectives was overwhelming and appalling.

One of the most astonishing things to me was the great number of young men who were afflicted with, and extremely susceptible to, intestinal and ano-rectal diseases. The next most astonishing thing was the absolute indifference of the medical profession in the Army, amounting almost to utter contempt for these apparently minor defects. This applies more particularly to the reserve officers from civil life, who went into the Army with visions of becoming great Army surgeons. Nothing except prospects for major operations appealed to them. It did not apply so much to the regular Army officers because they were fully aware of the great number of non-effectives made by these apparently simple ailments. I had then and have now the greatest admiration for the Medical Corps of the Regular Army, as it existed at the beginning of the World War.

With a Medical Corps sufficient only for an Army of 55,000 men, these self-sacrificing men, within a period of less than twelve months, converted 33,000 civilian doctors into the most effective medical military organization ever known to history. By rights and justice, all these Regular Corps men were entitled to serve at the seat of war, but being good soldiers, they sacrificed, possibly, the last opportunity to put into actual practice the work for which a life time of training had prepared them. They remained in the United States, many of them, with unceasing toil and energy, to convert these 33,000 civilian physicians, of all types and characters, into a most effective organization. While there may have existed, and still does exist, some dissatisfaction among the reserve officers, yet taken as a whole the work accomplished by the Regular Army Medical Corps will always stand in history as one of the greatest accomplishments of the war.

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*Read before the American Proctologic Society at its annual meeting in Memphis, Tenn., April 22-23, 1920.

As a result of the exigencies of the war thousands of defective youths were accepted for service only later to become wards of the Government. At one place where I was stationed for a period of five days for the observation of the number of intestinal and ano-rectal diseases there passed in the regular routine under my observation 472 cases. These are, therefore, not selected cases.

Of this number there were the following:

1. Hernia	46 cases
(a) Existed prior to enlistment	23 cases
(b) Acquired in the service	15 cases
(c) Recurrent	8 cases

All were inguinal and were operated upon in the Army with 17½ per cent. of failures. Of the eight recurrent cases, four were operated upon the second time; three, the third time, and one, the fourth time, with the hernia recurring the fifth time the abdominal wall completely relaxed.

2. Hemorrhoids	8 cases
(a) Existed prior to enlistment	1 case
(b) Acquired in the service	7 cases

All these were operated upon with three cases followed by fissure; one by incontinence; one by fistula; two by partial stricture.

3. Appendicitis	9 cases
(a) Acquired in the service	9 cases

All were operated upon with post-operative hernia in four out of the nine cases.

4. Fistula-in-Ano	5 cases
(a) Existed prior to service	3 cases
(b) Acquired in the service	2 cases

All were successfully operated upon.

5. Fissure-in-Ano	1 case

(a) Acquired in service.

Successfully operated upon.

6. Prolapsus-Recti (traumatic).

(a) Acquired in the service (wounded).

All of these cases excepting eight of the appendicitis cases and the fistula and fissure cases, and five of hemorrhoid cases, are permanent partial non-effectives for the rest of their lives.

If we figure the cost in dollars and cents to the Government, as based upon the actual compensation drawn by these patients according to the Compensation Act, we have some astounding figures. Taking the average life of an individual as thirty years, we have:—

1. Hernias—Permanent partial disability:		
(a) 38 cases 20%	$273,600	
(b) 4 cases 25%	36,000	
(c) 3 cases 40%	43,200	
(d) 1 case 50%	18,000	
Total for hernias		$370,800
2. Hemorrhoids—Permanent partial disability:		
(a) 1 case 50%	$ 18,000	
(b) 2 cases 25%	18,000	
Total for hemorrhoids		36,000
3. Appendicitis—Permanent partial disability:		
(a) Post-operative hernia 15%	5,400	
Total for appendicitis		5,400
4. Prolapsus Recti (non-operable)—Permanent partial disability:		
(a) One case, 75%	27,000	
Total prolapsus recti		27,000
Grand total		$439,200

This enormous sum for disabilities in so small a number of cases does not include the expense of subsequent treatment, hospital care, appliances, temporary total disability while in the hospital, nor does it include the increased compensation that may accrue from an increase of the disabilities already existing. This added cost in many cases exceeds the compensation.

Causes:—The first and primary cause of these deficiencies in the young men in civil life had its inception at birth. In other words, the health of children heretofore had been made a secondary matter in the affairs of life. The exigencies of warfare demand physical soundness and endurance rather than mental acumen, hence, the primary object is the most perfect development of the body.

In civil life no universal, systematic or compulsory arrangement had ever been instituted for the development of the physical as there had been of the mental condition of the youth of the land. In our homes, our public schools and our business world generally, the main end sought was material success, and if the human part of the machinery failed it was discarded as so much worn-out machinery. As a result of this the irregular habits of living, the dissipation of social life, etc., a generation of young men grew up with bodies of non-vigorous and non-resisting tissues, and when these young men from all stations and conditions of life were inducted into the service and subjected to rigorous military training, they fell prey to the infirmities of neglect.

The disabilities above-mentioned developed so rapidly that the hospitals were taxed to capacity and the Medical Corps was overwhelmed. In the poorly-nourished bodies of devitalized tissues the very processes of making soldiers operated alike in producing these disabilities and of causing subsequent operative failure. As a matter of fact recurrent hernia and failure of operation in the ano-rectal and other cases became so great that operations were prohibited excepting in emergency cases. However, these failures were not so much the fault of the operations, operator or technic, but were due to the extreme demands of military necessity that every available man be on duty.

The next most important cause of failure was the too early return to duty, contrary to the better judgment of the operator. Had the Medical Corps had in the beginning the same sense of their own power which they had six months after, the number of failures from a surgical standpoint would not have been so great.

Another cause of failure, especially in the hernia cases, was the "fad" that the operation wound should be left undisturbed for from eight to ten days after the operation. This mode of procedure led to many cases of pressure necrosis, causing a subsequent opening of the wound.

Another cause for failure arose from depending upon the untrained and unskilled attendant for post-operative care and dressings, which, also, was an unavoidable military necessity in the early period of the war.

Another important cause of failure of operation was the ill-fitting uniform the men were compelled to wear. It is well known that the soldiers were made to fit the uniform rather than the uniform to fit the soldier.

Another cause of failure was the use of the Army—and the accoutrement—belts. There were very few men in the early part of training who understood the proper use, and the proper manner of wearing these belts, in order to avoid injury to the abdomen and abdominal organs; this is particularly true in regard to recurrent hernia, intestinal obstruction and enteroptosis.

Comments:—Most of the bad results here enumerated would have been avoidable in civil life where the proper post-operative time for recovery could have been had. It would have been much better had these men been discarded in the beginning rather than later on, and incidentally it would have been less expensive.

I have seen many a nervous wreck buffeted about from organization to organization and called slackers, neurasthenics, psychopathic-neurotics, when an examination revealed a small fissure, ulcer or thrombotic hemorrhoid, which, when relieved, placed the soldier back in the ranks.

The lesson, however, has been taught and hereafter in the Army, the Medical Corps will not be subjected to the whims of any lay or line commanders. Another great lesson is that the 4,000,000 soldiers of the draft Army have been taught personal hygiene and sanitation, the value of regular habits and how to keep vigorous. If the lessons taught are carried into civil life and if the relatives and friends give the young boys the same attentive care and encouragement, and manifest the same interest as they did when entering the Army, and they keep in force even partially the lessons learned, there should be at least two generations of vigorous manhood.

ETHER PNEUMONIA.

Akron, Ohio, June 24, 1920.

To the Editor, American Journal of Surgery:

In his article on "Abdominal Hernia" in the June issue of the Journal, Dr. Leigh F. Watson says: "Local anesthesia removes the danger from ether pneumonia." It is strange that at this stage in the development of medicine we still meet those who speak of *ether pneumonia*. Post-operative pneumonia occurs as often and as severely after local anesthesia as after general. Yet whoever speaks of a *novocaine pneumonia*, a *chloroform pneumonia* or a *nitrous oxide pneumonia? Ether pneumonia* does not exist any more than does *laudable pus!*

If a patient who had no pneumonia before operation develops it afterward the cause was *chilling* during or after the operation. In Dayton, Ohio, five successive cases were traced to a too cold recovery room. Too much attention in operating rooms is paid to sterilization and too little to ventilation. Too hot a room, too much blanket are usually the cause of pneumonia through subsequent chilling.

I have administered ether and oxygen to patients with single and double pneumonia, without injury. If ether cause pneumonia why did these patients not get worse from it?

A. S. McCormick.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

New York, August, 1920.

CHRONIC APPENDICITIS.

It seems platitudinous to remark that there is no surgical disease in which the results of operation are more certain and more gratifying than acute appendicitis. The same may be said of the "interval" removal of the appendix that has been the seat of *bona fide* acute attacks. When we turn, however, to the larger group of cases of so-called chronic appendicitis (or what, we regret to say, so many of our writers persist in loosely dubbing "chronic appendix"), we have much less reason to be proud of our results. Indeed, it is notorious among surgeons who have followed any considerable number of cases, that in a very large percentage of operations for "chronic appendicitis" the patient is not at all benefited, even when we include those cases in which the pathologist obligingly finds, *microscopically,* evidence of disease. In a follow-up analysis of 555 ward cases of chronic appendicitis (of which 126 could not be traced), Charles L. Gibson reported in *The American Journal of the Medical Sciences,* May, 1920, that in 102 the results were unsatisfactory!

Many cases of so-called chronic appendicitis are not appendicitis at all; and one should be very slow to make this diagnosis in any case in which there have not been clear-cut and characteristic attacks. We say this with full appreciation that in many instances of true chronic appendicitis there are not any characteristic attacks, that unquestionably some cases with symptoms chiefly in the upper abdomen are due to appendicitis, and that, despite the absence of characteristic anamñesis, a *tentative* diagnosis of chronic appendicitis is often justified and appendicectomy *and abdominal exploration* are then indicated.

The hospital surgeon occupies an embarrassing position with these cases. He has not observed them over a long period and cannot keep them in hospital for that purpose, and, very often, despite his misgivings, he feels that he must "give the patient the benefit of the doubt," especially when, as is the rule, the diagnosis of appendicitis has been made by the referring physician.

It seems reasonably safe to say that every patient who persistently complains of pain, or exhibits tenderness, in the right iliac fossa will sooner or later be told by some physician that he has appendicitis and sooner or later, if he submits, some surgeon will remove his appendix. Nor are the physician and the surgeon the only ones to blame. Far more to be scolded, because they have *no* justification, are those roentgenologists—and they are not few—who boldly assert a diagnosis of "chronic appendix" (they, too, seem to like that sloppy mode of expression), because, noting no other misbehavior in the travels of the barium mixture through the digestive tract, they find a tracing, perhaps more or less irregular, of the lumen of the appendix! We venture to say that the cases of appendicitis that can be diagnosed by roentgenology are few and far between. As an instance in point, a man of thirty had suffered for some years with brief, almost daily, attacks of epigastric pain and vomiting of greenish fluid, usually an hour or so after breakfast. He was carefully observed by a competent gastro-enterologist, who finally came to the conclusion that the case was one of chronic appendicitis. A roentgenologist found a "segmented shadow of the appendix," but no abnormality in the outline or movements of the stomach or intestines; and he had the temerity to conclude his report: "Diagnosis:—Chronic appendicitis." At operation we found the appendix normal but the gall-bladder *and the common bile duct* full of stones.

If a large percentage of cases of "chronic appendicitis" are unrelieved by appendicectomy they are, of course, suffering from or, sometimes, *also* suffering from some other unrecognized disorder. In all cases in which, after anamnestic and diagnostic investigation, operation for suspected chronic appendicitis is decided upon the surgeon therefore should, as Gibson advises, "make a good-sized incision, and, even if a frankly pathological appendix is found, look for other possible lesions."

Unfortunately, in very many instances neither "a frankly pathological appendix" nor "other lesion" will be found. What is the matter with *these* patients; wherein lies the failure to properly evaluate their complaints and to arrive, if not at a definite diagnosis, at least at a non-surgical indication? The answer, it seems to us, lies sometimes in overlooking some extraperitoneal gross lesion, as, for example, urinary calculus, or locomotor ataxia; but more often the explanation is to be found in the *anamnesis*.

In most of our hospitals the histories are taken by internes who have not learned the importance of allowing the patient to tell his own story in his own way, and who have not the time to listen to the story even if the patient's surroundings or the interne's anamnestic skill encouraged him to tell it *all*. Difficulties are increased where, as in many of Gibson's cases, the patients speak only a foreign tongue. In short, the "history" is all too often merely the patient's replies to stereotyped leading questions. It tells the surgeon that the patient has or has had pain in the right side of the abdomen; that it is or is not related, in time, to eating; that he has or has not vomited, etc. It states his occupation but it makes no inquiry into those occupational postures or movements which might be responsible for his pains. It says that the patient is or is not constipated, but it gives no other clue to his habits of eating, of exercise, of diversion. Of the patient himself, his psyche, his temperament, his present and past troubles (other than "diseases"), it says nothing. It is common knowledge, or ought to be, that abdominal complaints not rarely are the expressions of mental distress—of a neurosis.

Gibson recommends, in his summary, "avoid the neurasthenics of any age or sex." This is sage advice, but we must add that the "neurasthenic" (a term that does not properly apply to all the patients with psychogenic abdominal complaints) can not always be recognized by these hasty, crude, stereotyped hospital histories, nor by two or three days of observation on "hospital rounds," where the surgeon, especially, habitually seeks and emphasizes the objective to the neglect of the subjective! One does not need to be a Freudist to appreciate that by "analyzing" these cases of "chronic appendicitis," that is to say, by quietly, sympathetically and patiently inquiring into the patients' affairs and their habits, vocational and otherwise, he would in many instances arrive at a clearer notion of their disorders. Unfortunately the hospital surgeon himself seldom has the time and often has not the requisite tact for these prolonged, intimate inquiries; and, too, very often they may avail him little. And so there probably will continue to be a considerable, but we hope steadily diminishing, number of cases in which he is led to remove what is, indeed, only a chronic appendix and not at all a chronically diseased appendix.

Surgical Suggestions

The pain of a rupturing tubal pregnancy is sometimes referred to the right hypochondrium and may even radiate therefrom to the right shoulder, thus simulating a gall-stone colic.

Sloughing aponeurosis in an abdominal wound has a characteristic odor that is quite diagnostic. It persists until the slough has been cast out of the wound.

In hernioplasties, especially inguinal, chromicized catgut does not last long enough and nonabsorbable sutures give much trouble in the event of infection. Slender kangaroo tendon is the ideal material. Likewise in bone surgery heavy kangaroo tendon sutures are to be preferred to wire.

Fractures through the head of the humerus or the greater tuberosity may advantageously be managed by simple abduction in bed (with a sling from the arm to head of bed) *without any immobilization*. It secures and maintains abduction and minimizes loss of function.

In determining the character of a swelling about the hip remember the occasional occurrence of tuberculosis of the trochanteric bursa. This causes thickening of the walls of the bursa and distension with fluid. It may attain large size and bizarre development, even appearing as a cyst-like growth far from its origin over the trochanter major.

The most common variety of dermoid in the region of the anus is the pilo-nidal or coccygeal cyst. Occasionally, however, dermoid cysts are found in the midline of the perineum; such a one at the anterior commissure of the anus may be mistaken for a hemorrhoid. A skin-lined "fistula" in the midline of the perineum is congenital and leads, usually, to a dermoid cyst.

Progress in Surgery

Selections from Recent Literature.

Edward Bleier, M.D., Abstract Editor.

Bone Grafting of the Fractured Mandible, with an Account of 60 Cases. Gilbert Chubb, England, *The Lancet,* July 3, 1920.

All but three of the 60 were gunshot fractures and all were operated upon at the Queen's Hospital for Facial Injuries, Sidcup. They are consecutive and unselected cases. In two cases the graft was lost owing to sepis. Erysipelas accounted for one of these and a discharging ear, not noticed prior to operation, apparently accounted for the other. In one case sinus formation resulted in non-union, and the eventual absorption of the graft; this case has since been regrafted. In another case the graft, which extended from molar to molar region, is healthy and the wound soundly healed, but union has not yet occurred at either end. In the remaining 56 cases, 93 per cent. of the series, firm bony union has been obtained. 51 of the cases had edentulous posterior fragments, and in 40 of these the loss of bone involved the region of the angle. In 16 of the latter the loss involved the ascending ramus also.

The graft was obtained from the crest of the ilium in all but the first two cases. This source has several advantages. The size of the graft is practically unlimited. All sclerosed and doubtful bone can, therefore, be freely removed from the jaw fragments. The soft and vascular nature of the iliac crest greatly facilitates the manipulation of the graft and its subsequent union and consolidation. Futhermore, it is possible by varying the position on the crest to obtain a graft of a general curvature suitable to each particular case. There is a complete absence of post-operative disability, even when the anterior superior spine has been removed with the graft. The cases were, as a rule, up and about 14 days after the operation, and in no instance has there been any complaint of the hip.

The aim, in every case, has been to obtain a sound carpentering junction between the graft and the jaw fragments, the bones being so trimmed that they fit end to end with accurate apposition of the largest obtainable areas of exposed vascular bone tissue. In this position they are firmly wired together. This technique was originally adopted in order to control the edentulous fragment and to facilitate early union by accurate and continuous appostion of opposed bone tissue. The technique has the additional advantage that it allows of the early exposure of the graft to the stresses incidental to muscular movement without risk of disturbing the close contact of bone tissue obtained at the time of operation. This early stress is a factor in determining rapid union was only gradually recognised as a result of the impracticability, in the great majority of the cases dealt with, of obtaining rigid post-operative immobilisation by means of splinting. Where no teeth are present on the posterior fragment the rigid splinting of the larger tooth-bearing fragment to the upper jaw does not relieve the grafted area from all muscular stress. Yet it was found that in over 60 per cent. of the successful cases union was of ivory hardness at the end of three to four months. In several of the cases, in which no effective control existed for either fragment from the time of the operation onwards, rapid bony union nevertheless resulted. Therefore the chief role of the dental splint is the maintenance of correct occlusion during the operation. The tendency to lingual deviation of the large fragment can be subsequently prevented by the interlocking of the splint when in closed bite or by means of a flange. In order, however, that early exposure of the grafted mandible to stress may be a factor in determining rapid union, it is important that it shall not involve any disturbance of the opposed bone tissue—that is, the "carpentering" at the time of the operation must be sound.

The technics of the operations, under various conditions, are described in detail and illustrated. Pre-and-post-operative treatment are discussed, and the 60 cases are analyzed.

What this valuable combination chiefly emphasized, by way of underlying principles in technic, is that the graft and jaw fragments were so trimmed as to fit accurately end to end, with the largest obtainable areas of exposed vascular bone tissue held in close contact by firm wiring. *The close apposition results in early bony union, while the firm fixation allows of the bones being subjected at once to some degree of muscular strain without fear of displacement, thus leading to the early consolidation of the primary union.*

Concerning the fate of the free graft, Chubb says: "General opinion is, on the whole, tending towards the view that the free graft remains alive and takes an active osteo-genetic share in the union. The graft, with its thin tables of compact bone, is relatively more transparent in the earlier post-operative radiographs than is the far denser mandible. There is, however, no constant post-operative increase in this relative transparency. On the contrary, successive radiographs show a uniform increase in the opacity of the graft."

Some Prinicples Involved in the Treatment of Empyema. Evarts A. Graham, St. Louis, *Surgery, Gynecology and Obstetrics.* July, 1920.

The author calls attention to the extensive recent literature on empyema thoracis, which reveals a striking tendency towards standardization of treatment, and a radical departure from the methods in use before the war. Graham was a member of the U. S. Army Empyema Commission. The cardinal principles of the newer therapy are avoidance of a pneumothorax during the acute stage of the disease, early obliteration and sterilization of the cavity, and the maintenance of the nutrition of the patient.

Graham points out a very important and almost universally prevalent misconception as to the mechanism of action of an open pneumothorax. In the normal thorax the mediastinal structures, instead of constituting a more or less rigid partition between the two pleural cavities, are in reality so mobile, that they offer a resistance to pressure equal to only 0.4mm. of mercury. This resistance is therefore negligible from the standpoint of pressure relationships, and the thorax can be considered as one cavity instead of two. Any change in pressure, therefore in one pleural cavity, will manifest itself to the same degree in the other pleural cavity, with the result that both lungs will be about equally compressed. This is proved experimentally. These principles have a very important bearing on the treatment of empyema, especially in the acute stage, before adhesions are formed, and they explain the danger of open thoracotomy at this stage. After adhesions have formed and the mediastinum has become somewhat stabilized, the pressure relations are different on the two sides, and open thoracotomy is no longer dangerous to life.

Tidal Irrigations of Wounds. W. H. Taylor and N. B. Taylor, Guelph, Ontario, *Journal of the American Medical Association,* June 19, 1920.

The tidal irrigations of wounds had its origin in France. The improved apparatus and the technic of its use were developed largely by W. H. Taylor and N. B. Taylor, during the latter part of the war, in Canadian hospitals in England. Reports of cases and descriptions of the method and the appliance were published on various occasions under the caption of "liquid-tight closure." The practicability of tidal irrigation is dependent on liquid-tight closure, which renders possible the copious flushing of wounds without wetting the dressings. The wound is covered by a flexible rubber cap whose brim makes contact circumferentially with the neighboring skin. This ring contact with the skin is water-tight; and the fact of its water-tightness is the sine qua non of this system of treatment. Two tubes leave the top of the cap, the inflow connected with an elevated reservoir and the outflow leading to a waste vessel set below the level of the wound. Each tube communicates with the interior of the cap which, in turn, is continuous with the cavity of the wound. From the reservoir to the waste pail, then, we have a single "pipe line," the dilated section of which is comprised by the wound and its covering cap. This capcovered wound is capable of containing fluid, even under considerable pressure. Flooding of the wound is effected by closing the outflow and opening the inflow tube. Suction in the wound is brought about by siphonage; this is established by closing the inflow and opening the outflow. Thus positive and negative pressure may be alternated by the manipulation of pinch cocks on these tubes. The rubber cap is seen to distend during positive pressure and to shrink during negative pressure. There is no moisture of the dressings to suggest that the wound beneath is being flooded. Continuous irrigation is never used. The wound is filled and left for a time. It is then emptied and allowed to remain under the influence of negative pressure until refilled from the reservoir. No drainage tubes are used, for the simple reason that the wound itself constitutes, actually, the expanded portion of the conduit leading from the irrigator to the waste vessel, and that continuity of fluid pressure extends into every side track of this conduit, that is to say, into all the ramifications of the wound. For full details of this method, the original article should be consulted. The authors and others have treated more than 400 cases by this method, and the results obtained have exceeded even the expectations which the logic of the procedure seemed to justify. A good proportion of the cases treated were recently infected wounds.

Technic of Operations upon Peripheral Nerves. C. C. Coleman, Richmond, Va. *Southern Medical Journal*, June, 1920.

Coleman's paper is based on 132 operations on peripheral nerves, performed at U. S. Army Hospitals 41 and 11. Three types of operation were done: (1.) liberation of the nerve or neurolysis; (2.) suture; (3.) transplantation. Most of the patients were operated upon more than three months after the original injury. Surgical treatment becomes necessary when the evidence of satisfactory regeneration of the nerve cannot be obtained by careful examination of the patient. The injury to the nerve may consist of partial or complete division, stretching, contusion, and incarceration in scar tissue or callus. The site of the injury usually shows a neuromatous enlargement which may often be palpated through the overlying soft tissues. The difficulties in reaching a decision to operate on nerve injuries can be solved only by a knowledge of the anatomic distribution of nerves, an investigation of the motor, sensory, and electrical phenomena, and a familiarity with the normal processes of regeneration.

Liberation is indicated when the nerve is compressed by scar tissue or bound up in callus. It is beneficial only when the interference with nerve function is extra-neural and can not possibly be of help to paralyzed nerves when the neuraxes are destroyed or obstructed by intraneural scar tissue.

Suture is indicated when there is anatomical interruption of the nerve or intraneural obstruction by fibrous tissue without satisfactory signs of regeneration. In preparing a nerve for suture, all scar tissue must be completely removed and the healthy funiculi uncovered by serial sections made with a sharp knife.

Nerve transplantation is indicated when the segments of the divided nerve, after removal of the fibrous ends, can not be approximated without hurtful tension. The autogenous nerve graft taken from a superficial sensory nerve is the best material to fill in a defect in a motor or mixed nerve. The method of Huber by which a cable of several segments of a sensory nerve, generally the musculocutaneous of the leg, is transplanted into the defect, seems best to fulfill the histologic requirements for regeneration.

The general technic of operations upon peripheral nerves must necessarily vary from that of surgery upon structures of coarser function. The operation is often long and tedious by reason of dense scar tissue. Scars over the incision for the exposure of the nerve should be excised, because the healing of such scars is frequently very unsatisfactory.

A tourniquet is unnecessary and may cause paralysis of a healthy nerve and tendency to post-operative hematoma. Drainage is avoided by ligation of every oozing vessel. Dissection should be with a sharp knife as a rule, although in a case of the ulnar just beneath the elbow joint one blade of a pair of scissors may be thrust into the groove, and by putting the nerve in slight tension, exposure may be made more rapidly. Dissections through scar tissue may be facilitated by continuous saline irrigation, but the uncontrollable slop outweighs its advantages. Local anesthesia may be used in the shorter operations and is helpful in the study of nerve topography, but as a rule ether is to be preferred.

Physiopathic Paralysis of the Hand and its Causation. R. G. Abercrombie, England, *British Medical Journal*, June 5, 1920.

Abercrombie reviews the lesion first decribed and named by Babinski.

Without apparent adequate cause, a wound of the upper limb is followed by loss of power in the hand of the affected side. Neither the situation nor character of the wound bears any relation to the grade of the subsequent paresis; none of the symptoms correspond to the territory of any particular nerve.

The short muscles of the hand and the long flexors are chiefly affected. The muscles are sometimes limp, more often spasmodically contracted, so that the hand assumes various postures; frequently the palm is hollowed and the fingers imbricated one over the other, to form the so-called "accoucheur's hand." The paralysis is usually not complete; feeble movements can be performed in a tremulous or "waggling" manner. The thumb often escapes, so that the hand can meet the needs of a hospital patient or pensioner, though inadequate for any useful purpose.

The sensory symptoms are limited to an uncertain and varying hypesthesia and contortions of apparent pain on the performance of passive movements. The patients are unduly apprehensive of pain, and are devoid of the normal impluse towards recovery.

The affected muscles waste, often extremely; they exhibit mechanical hypereexcitability; slight electrical changes occur but the reaction of degeneration is not present. The skin, subcutaneous tissue, and bones share in the atrophy, so that the whole hand appears attentuated and smaller than its fellow. The skin is salmon-pink or cherry-red in color, with a satin-like sheen around the roots of the nails. Trophic sores do not occur. The nails are curved and longitudinally grooved, sometimes greatly deformed; beneath their free margin a small fold of skin is often visible.

Profuse sweating of the palm is a common and striking feature; and it is of special interest that this symptom is directly influencel by emotion. If the affected hand be unexpectedly seized and examined, the palm may be found normal or slightly moist; if now the hand be made the subject of discourse to bystanders, beads of sweat form upon its palmar surface, until finally a sheet of moisture is formed over the whole palm. The palm of the opposite hand may also become moist, but not to anything like the same extent; meanwhile the rest of the body shows no abnormal sweating. Localized flushing of the affected hand may sometimes be similarly produced.

The emotional strain of war causes an increased suggestibility, with consequent liability to hysterical paralysis; the same emotional strain may also induce a disturbance of the sympathetic, the ciculatory and trophic effects of which show themselves especially in the tissues of the paralysed member, partly on account of its immobility and partly owing to the localizing influence of the patient's emotions. This two-fold effect of hysterical paralysis with severe trophic changes constitutes the physiopathic condition.

Psychological treatment by means of explanation, strong encouragement and re-education is the essence of success in dealing with these cases. The removal of the morbid mental state cures the paralysis and simultaneously eliminates the scource of the perverted sympathetic impulses which are the cause of the trophic changes, the disappearance of the latter being greatly facilitated by movement and physical therapeutics. Recovery is almost invariable, and relapse is rare. Treatment is rendered noticeably easier by the patient's demobilization from the army.

A Splint for the Treatment of Stiff Fingers.
Major F. G. A. Ulrich, New Zealand. *The Journal of Orthopedic Surgery,* June, 1920.

The splint, which is called the Finger Flexion Splint, is used solely to gain flexion at the metacarpophalangeal and inter-phalangeal joints of patients whose fingers are stiff in an extended or partly extended position and whose wrist joints may be normal or can at least be dorsi-flexed to a useful degree as nearly as possible approximating the position of physiological rest.

The splint is made of 3/16" milled steel and is fashioned to fit across the palm of the hand opposite the metacarpal necks, curved to retain the arch of the hand as much as possible. It is bent along the ulnar and radial borders of the hand and forearm, passing between the thumb and index finger and kinked forwards at the wrist to follow the contour of the dorsi-flexed wrist joint. The palmer bar of the splint is neatly fitted with rubber tubing but probably any soft tissue would do. The ends of the splint are hooked and terminate about three-fourths of distance up the forearm. Usually a roughened metal strut is welded to the limbs of splint near the hooked ends to facilitate firm incorporation in plaster of Paris.

The *principle* of the splint is retention of wrist in a constant degree of dorsi-flexion while flexion of fingers is gained by tape and glue applied to their dorsal surfaces. The writer first used this method at Alder Hey almost two years ago.

The splint is retained in position by plaster of Paris applied to the upper part of forearm and elbow—elbow joint being flexed to 90°.

The plaster and glue having dried for 24 hours flexion of fingers may be commenced by noosing the 4 tapes through the flexion loop as firmly as patient can bear it.

The flexion is divided into two stages:

1. Flexion of metacarpo-phalangeal and first inter-phalangeal joints. This is continued until pads of fingers approximate the thenar and hypothenar eminences.
2. Flexion of first and second inter-phalangeal joints. This is gained by passing the tapes between the palmer bar and the palm and applying traction as before. The mild pressure of tapes on base of hand has never caused any inconvenience.

Some advantages claimed for this splint are:

1. Constant degree of dorsi-flexion.
2. Flexion is painless, continuous and easily graduated in the individual fingers.
3. Flexion is divided into two stages.
4. No impediment to circulation of fingers by encircling bands.
5. Accessibility of hand and greater part of forearm for massage and electric treatment without removal of the splint.

This last advantage is of greater importance and has made it possible to use the splint in all cases whether traumatic, ischaemic, or functional.

Ingrown Toenails.
J. V. Becelaere, Detroit, (Editorial) *Detroit Medical Journal,* May, 1920.

Many local applications have been attempted: iodine tincture, subsulphate of iron, powdered alum, etc. The most efficient plan of treatment, however, and the only one calculated to end the trouble in shortest time and with the least amount of pain and expense, is ablation—total or partial—of the offending nail. Under observance of strictly aseptic precautions the entire dorsal aspect of the terminal phalanx is thoroughly frozen. This is best effected through the use of ethylene choride, sprayed from a distance of about two inches over the entire surface until it suddenly flashes white, and a few seconds longer to insure sufficient penetration, the operation proper being done at once, before normal circulation has time to become re-established.

Partial ablation is effected by means of stout shears, the pointed blade of which is run lengthwise under the nail, at least one-third from the offending edge, and spitting it down to the matrix. Evulsion of the detached segment is best effected with a strong artery forceps. This mode of procedure allows the entire inflammatory process to die out (for this time at least) but nothing short of thorough destruction of the corresponding portion of matrix will insure freedom from recurrence, and is best effected by the use of the thermo-or-galvano-cautery.

Total ablation is but an extension of the same procedure by which the entire nail is removed in a similar manner, either at once, or after splitting it in halves as previously stated. Here again nothing short of thorough destruction of the ungual matrix will insure against ultimate recurrence of the same trouble under similar circumstances. After-treatment consists preferably in the use of starch-poultices for the first few days to be spent in bed and, later on, a slight adhesive strapping of the affected phalanx.

By this plan patients are allowed to resume their usual avocation after two or three days at most, and at the cost of little time and minimal expense.

Surgery of Congenital Hypertrophic Stenosis of the Pylorus.
Richard Warren, London, *The Lancet,* June 26, 1920.

Warren reports twelve cases treated surgically by gastrojejeunostomy and by Ramstedt's operation. On careful examination of available statistics he believes that most cases of hypertrophic stenosis of the pylorus die if treated medically. On the contrary, surgical measures, including cases which have become debilitated by overlong expectant treatment have cured 60%, whether by gastro-enterostomy or Ramstedt's operation. Where the diagnosis is reasonably certain from the finding of a small tumor, presumably the pylorus, with the other signs of pyloric obstruction, operation should be undertaken without delay, and should be regarded as the normal treatment. Where the diagnosis is not absolutely certain, medical measures may be undertaken for a few days while careful and frequent examinations are made for the pyloric tumor. If projectile vomiting persists, feces remain abnormal, and the weight decreases, a laparotomy should be performed, and the pylorus hooked up through a small incision and examined. Although there is not much difference in the recovery percentage between the cases treated by gastro-enterostomy, and those treated by the Ramstedt operation, the latter will probably be the operation of choice in the future, on account of its less severe character. If employed early in all cases, the results could probably be considerably improved. There is a great disturbance of metabolism in these infants, rendering the after-treatment a problem in feeding to be solved in each case individually.

The Duodenal Tube in Diagnosis and Treatment of Gall Bladder and Biliary Disease.
Samuel Weiss, New York, *Western Medical Times,* June, 1920.

Weiss discusses the newer methods of examining duodenal contents, before and after the injection of magnesium sulphate into the duodenum. He describes the procedure after the introduction of the tube as follows: after the bile is obtained the patient is put in the fully recumbent position with the head directed toward the edge of the bed, the tubing is allowed to remain suspended over the side of the bed in such a way that by siphon action there will be a tendency toward the steady flow of bile. After the flow has commenced and the first part is discarded, three culture tubes are used in the following way; after obtaining some bile in the first culture tube it is set aside for bacteriologic, cytologic and chemical examination. We now introduce, by means of a sterile syringe from a sterile container 25 to 50 c.c. of a sterile, 25 per cent. solution of magnesium sulphate, and start gentle aspiration. After several minutes bile begins to flow and when the color is quite yellow, the material already collected is poured into a sterile container and further drainage is continued.

The first bile collected is probably from the bile ducts, as it is lighter yellow and more transparent and less mucoid. Later the bile aspirated becomes darker and more concentrated, and in normal cases remains transparent. This bile is stored up in the gallbladder. On further aspiration this dark bile changes to a lighter yellow, thin and usually transparent bile which flows intermittently, and is believed to be freshly secreted bile from the liver.

Through this method one is able to collect separately bile from the different parts of the biliary system, and study each sample as to its various ingredients.

1. In choledochitis, the bile first collected is more viscid, with much flaky mucus and is usually turbid. It contains quite some pus cells, epithelial cells and at times red blood corpuscles. Culturing may show pathogenic organisms.

2. In cholecystitis without inflammation of the ducts, the bile is usually normal, and on culture no pathogenic organisms are found. The second bile shows quite a change; it is more viscid, turbid, and flaky, and stringy mucus is found in abundance. Pus cells, red blood cells and desquamated epithelium are quite frequent. Cultures show pathogenic organisms. The color varies from light golden yellow to dark molasses yellow and turbid. At times aspiration is difficult.

3. In the presence of gall stones the findings are the same as in cholecystitis with the addition of a sediment resembling lime.

In reference to topical treatment, the author believes that a new field has been opened in the treatment of biliary disease. He believes that local applications of magnesium sulphate are efficacious in producing a discharge of biliary calculo. Local antiseptic may also be used.

Ruptured Malarial Spleen: Splenectomy: Recovery. Cyril A. Raison, England. *British Medical Journal,* June 19, 1920.

Raison reports a most unusual case of recovery following splenectony for traumatic rupture of the malarial spleen. The patient was a Macedonian, aged 56, and presented on admission the picture of ruptured spleen. The operation was performed under local anesthesia and gas-and-oxygen. There was a large amount of free blood in the peritoneal cavity. The spleen was greatly enlarged, the anterior surface of its capsule was almost completely raised from the matrix, and showed an irregular tear about four inches long. There were many adhesions, especially to the diaphragm, which caused considerable difficulty in delivering the spleen and clamping the pedicle. The spleen was found to be 13 inches long, 6 inches wide and weighed three pounds and two ounces. The previously reported cases of rupture of malarial spleens in the presence of adhesions have been practically uniformly fatal. This patient made a complete recovery.

Notes on an Operation for Large Midline Ventral Hernia. George Chiene, Edinburgh. *Edinburgh Medical Journal,* June, 1920.

In order to overcome the tension encountered in the repair of large midline ventral herniae, Chiene has devised an operation which eliminates entirely the lateral pull of the abdominal muscles. It is this tension which makes repair so difficult and which accounts for the frequency of recurrences. In addition this new operation has the advantage of superimposing another layer of sutures in the midline where the repair is effected.

The hernial contents having been dealt with in the usual way and the fibrous edges of the hernial opening having been pared, so as to demonstrate the various abdominal layers, the skin and subcutaneous tissue are freely undermined as far as, or just beyond, the outer border of the rectus muscle on either side; two vertical incisions are then made at this point parallel with the outer border of the rectus muscle through the aponeurosis of the external oblique. Those incisions should extend at least an inch beyond the upper and lower limits of the hernial opening. Secondary horizontal incisions are then made at the upper and lower ends of the vertical incisions. By dissection towards the middle line two flaps of fascia are formed with their hinges about the middle of the anterior sheath of the rectus muscle.

The vertical incisions through the aponeurosis of the external oblique muscles at once diminish the tension or lateral pull of the oblique muscles. When the edges of the wound are drawn together two large ovoid gaps are formed in the external oblique, through which the internal oblique is exposed to view. After the various layers of the abdominal wall have been sutured the fascial flaps formed from the external oblique overlying the outer border of the rectus muscle are turned inwards, overlapped, and sutured in the middle line, which is thus considerably strenghtened.

The ovoid gaps in the external oblique cause no untoward post-operative symptoms or complications.

The Radical Cure of Femoral Hernia. (*La Cure Radicale de la Hernie Crurale*). F. M. Cadenat, France, *Revue de Chirugie,* 1920, No. 2.

Cadenet describes the Hartmann operation which he has performed successfully in 100 cases. The essential features of this operation are: 1. The inguino-crural approach; 2, longitudinal division of Poupart's ligament; 3, closing off the femoral ring by a double curtain, consisting of the conjoined muscle and the external oblique, which are sutured to Cooper's ligament. The advantages of the inguino-crural incision are, that it permits the high ligation of the sac, and the exposure of Cooper's ligament from below. It thus combines the virtues of the inguinal and crural incisions. The division of Poupart's ligament longitudinally is necessary to the complete exposure of Cooper's ligament and its suture to the two layers mentioned.

The technique is outlined. An 8 cm. incision is made. The first part of the incision is parallel to the groin and extends to the neck of the hernia; it is then continued downwards into the thigh directly over the hernia. The aponeurosis of the external oblique is incised vertically at the border of the femoral vein for a distance of 2 cm. to Poupart's ligament. This incision is then continued, dividing Poupart's ligament longitudinally, parallel to its cause as far posterior as possible. The sac and its contents are treated in the usual fashion, ligating as high as possible. Cooper's ligament is now easily exposed by retracting upwards the divided upper edge of Poupart's ligament, and the conjoined muscle. The repair is effected by suturing these two layers to Cooper's ligament thereby screening off the crural opening.

Nephrotomy in Eclamptic Anuria. (*La Nephrotomie dans L'Anurie Eclamptique*). Maurice Gerard, Lille, France. *Journal d'Urologie,* Vol. 9, No. 2.

In a rather complete article on this subject Gerard presents the pathology of eclamptic anuria, reviews the indications for surgical intervention as presented by various authorities on the subject, and compares the operations of decapsulation and nephrotomy with drainage of the renal pelvis. He reports a cure by the latter operation in a case of complete anuria. Although the indications for surgical interference in eclampsia have not been definitely established, the idea is generally prevalent that anuria in these cases is definite justification for operation. From a comparison of experimental and clinical results the author believes that nephrotomy and drainage has a better effect than simple decapsulation. A study of statistics from various scources (Albrecht, Lance, Poten) show that in eclampsia the mortality after decapsulation is greater than after simple medical treatment. In cases of anuria the comparison is still more unfavorable. Gerard has been able to collect only four cases of nephrotomy and drainage for anuria, to which he adds five of his own. The mortality was 40%, but the favorable results were striking. The anesthesia should be brief, preferably nitrous oxide. The author feels warranted in offering the following conclusions: 1. In cases of eclamptic anuria, after the usual medical treatment, evacuation of the uterus, and repeated phlebotomies have failed, surgical treatment is indicated. 2. The operation should consist of nephrotomy and drainage of the renal pelvis, with decapsulation of the same kidney. Only one kidney should be attacked.

Icterus in Ectopic Gestation. Edgar H. Norris, St. Paul, Minn. *Surgery, Gynecology and Obstetrics* July, 1920.

Norris calls attention to an unusual symptom of ectopic gestation, which may be of great importance in differential diagnosis. He reports four of his own cases of tubal pregnancy in which icterus was present. The following principles are elaborated.

1. Jaundice is a not uncommon symptom of ectopic gestation.
2. The presence of jaundice is of great importance, and may frequently be the symptom which determines the differential diagnosis.
3. The jaundice in these cases is probably due the absorption of blood-derived pigments produced by the hemolysis of extravasated blood.
4. The blood serum often contains considerable quantities of blood pigments (hemoglobin, hematoidin, hematin, hemochromogen).
5. In the progress of the differential diagnosis, the blood serum should be studied both grossly and with the aid of the spectroscope.

Cesarean Section under Local Anesthesia Combined with Morphine and Scopolamine Narcosis.

Frederick C. Irving, Boston, *Boston Medical and Surgical Journal,* June 3, 1920.

The author believes that Cesarean section offers the best solution in cardiac disease where decompensation has occurred, because it is attended by a minimum of shock, and because by its employment the stress and strain of labor are avoided. It also gives an opportunity to sterilize the patient, which is usually advisable. The chief objection to cesarean section is, that more frequently than after most laparotomies it may be followed by distention, and by dilatation of the stomach, both of which may prove disastrous to an already embarrassed heart. These complications may be avoided by attention to three details. 1. The use of the low abdominal incision entirely below the umbilicus. In this way the stomach and intestines do not come into the field of operation at any time. 2. The close approximation of the uterus to the abdominal wall by the hands of two assistants who exert firm pressure exteriorly against the patient's flanks until the uterine contents have been entirely evacuated. In this way the soiling of the peritoneal cavity by liquor amnii and blood is avoided. 3. The avoidance of gauze packs, either wet or dry. The forcing of gauze between the parietal peritoneum and the uterus causes considerable irritation. Local anesthesia eliminates most of the dangers of general and spinal anesthesia. One-sixth gr. of morphin and 1/200 gr. scopolamine are given subcutaneously. This is repeated at 40 minute intervals until the patient is quiet and dozing. Three doses are usually necessary. The operating room should be kept absolutely quiet and no talking permitted. The operation and local anesthesia are conducted along the usual lines.

The author concludes:

(1) Cesarean section under local anesthesia combined with morphine and scopolamine narcosis is a useful and successful method of delivery in some of the graver complications of pregnancy. Among these are cardiac disease where one or more attacks of decompensation have occurred, diabetes, nephritis and cardiorenal disease, pulmonary tuberculosis and bronchial asthma.

(2) In general, it finds its application in those cases where we wish to avoid the pain and physical exertion of labor, the possible shock of an operative pelvic delivery, and the danger of general anesthetic.

(3) Plenty of time must be allowed for both the general medication and the local anesthetic to act.

(4) Deliberate operating, with studious avoidance of roughness, is essential to success.

The Interpretation and Clinical Significance of Uterine Hemorrhage.

Emil Novak, Baltimore. *Medical Record,* July 10, 1920.

The logical basis for the study of uterine hemorrhage is the study of normal menstruation.

In many cases uterine bleeding is explainable along purely anatomic lines, especially in the case of such destructive lesions as cancer.

In perhaps the largest group of cases—those in which there exist one or more of such non-destructive lesions as adnexitis, myoma, uterine displacement, etc., both mechanical and functional factors play a role, the latter having to do most frequently with a disordered ovarian function. In the case of ectopic pregnancy, still another factor must be borne in mind—that exerted by the death of the embryo.

The third group, comprising the cases of uterine hemorrhage spoken of clincally as functional, is dependent altogether upon a disordered ovarian function. The hyperplasia of the endometrium so frequently found in these cases is secondary to this underlying ovarian endocrinopathy.

Radium Treatment of Chronic Leucorrhea.

Arthur H. Curtis. *Journal of the American Medical Association,* June 19, 1920.

In a series of forty-six cases the patients were subjected to a thorough pelvic examination, the reaction of the discharge tested, smears obtained from the cervix and vagina, and a set of cultures made. Gross pathologic lesions were corrected surgically. The usual hygenic measures were instituted. The most usual and most difficult focus to eradicate lies in the endocervix. Unless the discharge is essentially of vulvovaginal origin, radium is advocated in all severe cases of persistent chronic leucorrhea. After thorough dilatation, the cervix and fundus may be curetted for diagnostic purposes. Fifty mg. of radium, preferably two 25 mg. tubes in tandem, are introduced high into the cervix, held by a suture passed through the external os, and left for several hours. One or more subsequent radium treatments of shorter duration may be required. It is best to plan on an interval of from ten to twelve weeks between applications. Each radium tube employed in the treatment of this series of cases was screened by a double gold capsule with a total thickness of 2 mm. The capsule in turn was incased in dental rubber. Examination of cervical tissues after successful radium treatment reveals atrophy of the glands, relative increase in fibrous tissue, and disappearance of microscopic evidences of infection. Skene's ducts harbor the next most important focus. At the time of radium application, or under procain anesthsia, the blunt end of a needle, held in forceps, is threaded into the duct lumen, and its end is forced through the base of the duct so that the needle head protrudes into the vagina. The duct is split with a knife and the tract fulgurated. Bartholin duct infection may be eradicated by similar treatment. Infected Bartholin glands rarely require excision. The urethra is occasionally treated by dilatation, aided by instillations of weak silver nitrate solution. Twenty-five patients were cured; 7 were improved; 4 were not improved; in 10 cases no report can be made as yet.

Radium Treatment of Non-malignant Uterine Bleeding. Some Immediate After-Effects.

William P. Graves, Boston, *New York Medical Journal,* June 5, 1920.

While the author is an enthusiastic exponent of radiotherapy in uterine bleeding, he calls attention to some disagreeable sequelae, upon which not sufficient stress has been placed by writers on this subject. The most common of these is nausea. The author finds it more severe than after curettage. The radium is applied under slight gas-oxygen anesthesia, but the nausea cannot be entirely explained by the anesthesia. Striking relief is often obtained as soon as the radium is removed from the uterus. The origin of the nausea cannot be definitely explained, but it is probably due to the fact that the radium acts as a foreign body. Persistent bleeding is an occasional after-effect. It is most common in cases of myomata of the uterus. It cannot be explained. A thin watery discharge is most often present after bleeding has been partly or completely checked. It usually lasts from a few days to several months. The discharge is probably due either to superficial necrosis of the endometrium, or a stimulation of the endometrial glands. Pain in the pelvis should not occur except in the presence of adnexal disease. It is of serious import, because it is usually a forerunner of an inflammatory process. The author presents two illustrative cases. Very rarely there may be an exacerbation of a latent nephritis. Nervous symptoms are of peculiar interest. If menses are inhibited, hot flushes are common but not constant. The influence of the ovarian secretion is strikingly illustrated in cases where after a period of amenorrhea, the menses return, with a complete synchronous disappearance of the flushes. Occasionally, even in the absence of other ovarian symptoms, there may a specific depressing influence on the nervous system. However, this occurs in patients of neurotic taint who might react to any other agent in a similar manner.

Radium-X-Ray Therapy of Carcinoma Uteri and Uterine Bleeding. Frank S. Bissel, Minneapolis, *Minnesota Medicine*. June, 1920.

Bissel calls attention to the ever-increasing importance of radio-therapy in the field of uterine carcinoma and other conditions associated with bleeding. The choice of method in carcinoma of the cervix, whether to operate or radiate, is still an open question, but the tendency seems to be towards radiation. The author believes that combined radium and *x*-ray therapy is the treatment of choice in all cases of cancer of the cervix. In the early cases, conservative surgery followed by radiation is justifiable, but probably the latter alone will prove equally effectual. In carcinoma of the fundus, surgical results have been good and all these cases should be submitted to operation. As in all other cancer cases the patient should be given the added benefit of post-operative radiation. Radiation should be accepted as a specific in the menorrhagias due to myoma or fibrosis or those of unknown etiology. Bissel reports some striking cases of cures in the conditions above-mentioned.

Pneumoperitoneum and X-Ray Examinations. B. H. Orndorff, Chicago. *Illinois Medical Journal*, June 1920.

After discussing in detail the technic of the procedure of producing pneumoperitoneum, and the method of radiography, the author feels justified in presenting the following summary.

1. Pneumoperitoneum is not difficult to produce and while a few important points in technique are essential, they require no special training other than the training of a physician.
2. The size, position, mobility, relative density, variations in contour, contents and cavities of the abdominal viscera can be visualized and studied in a manner which opens to physicians entirely new possibilities.
3. Findings are encountered which seem to invite the conclusion that the basis for possibly new clinical disease entities have been established.
4. Peritoneal adhesions between abdominal viscera and the anterior abdomial wall are demonstrated without difficulty. The importance of the functional pathology originating from this source will be studied carefully by the workers in this branch of medicine.
5. Fixation of the gastrocolic omentum to the anterior abdominal wall is frequently accompanied by the symptom of vomiting with or without nausea. In seven cases the symptom was relieved by pneumoperitoneum and returned when the gas was absorbed.
6. Perihepatitis, perisplenitis and pericolitis with fixation by peritoneal adhesions to adjoining viscera offer new phases for the study of functional pathology of these organs.
7. After pneumoperitoneum has been produced, aid in diagnosis is offered by filling of the colon, stomach, intestines, bladder, kidney, etc., with oxygen. Variation in the diameter of the walls of the hollow viscera with changes in relative density and the presence of new growths may be detected.
8. Post-operative peritoneal adhesions to the anterior abdominal wall may be prevented by keeping the peritoneal cavity distended with oxygen for a few days following operative procedures.
9. Pneumoperitoneum produced with oxygen probably possesses therapeutic virtue in peritoneal tuberculosis.

Puerperal Infection treated by Intravenous Injections of Ammonical Sulphate of Copper. (*Les Infections Puerperals traitées par les Injections Intraveinenses du Suefat de Cuivre.*) H. Noire, *La Presse Medicale*, June 5, 1920.

The author reports four cases of puerperal infection cured by intravenous injections of the above-mentioned salts after other methods had failed. These observations correspond with those published by Maute in July, 1918, on the action of the salt in cases of streptococcemia. The action seems to be of a specific chemotherapeutic nature. The ammoniacal is preferable to the ordinary copper sulphate, because its injection is followed by no untoward symptons or reactions. The chemical preparation of the ammonical salt is described. The author advises injections morning and evening of 8 cgm. of the prepared salt, to be continued until the fever subsides. This usually occurs within three days after the treatment has been instigated.

Radiologic Exploration of the Kidney. Fluoroscopy and Radiography of the Kidney with Peritoneal Insufflation. (*L'Exploration Radiologique des Reins. La Radioscopic et Radiographie du Rein par le Procéde de L'Insufflation Peritoneale*). Ribadeau-Dumas, Mallet and Laulerie, France, *Paris Medical*, June 12, 1920.

The authors describe the marked advantages of radioscopy after peritoneal insufflation over *x*-ray pictures obtained by the ordinary method. For pictures of the kidney they inject one to two liters of oxygen. Pictures are taken in three positions to obtain complete and accurate information. These are named the left lateral, the right lateral, and the abdominal. The last named gives the most information. To determine accurately the form, size and position of the kidneys, all three positions may be necessary. Displacements are easily recognized, although errors may be made in interpretation due to the angle at which the pictures are taken. In the nephritides the *x*-ray may occasionally show the surface irregularities and sub-cortical cysts. Hydronephrosis gives an enormuos shadow, smooth and regular in outline. Tumors of the kidney also throw very large shadows. but these are irregular in outline and indented giving the shadow an entirely different aspect from that of hydronephrosis. Polycystic growths of the kidney show large shadows with numerous arc-shaped irregularities. As in radiography of other abdominal organs, the introduction of peritoneal insufflation has marked a tremendous advance in the science of diagnosis.

A Troublesome Complication of Gonorrhea. Its Treatment. Hamilton W. McKay, Charlotte, N. C., *The Urologic and Cutaneous Review*, June, 1920.

McKay performed the following operation in his series of cases of acute epididymitis: The testis was held firm and rotated on its upper pole. An incision one and a half to two inches long was made down to the tunica vaginalis. The scrotal contents having been delivered, the tunica vaginalis was opened and the contents of the accompanying hydrocele evacuated. The epididymis was exposed and at some selected point opened with a cataract knife. A Hagedorn needle was introduced and the point of suppuration sought for. Drainage was instituted, and the incision closed. The following conclusions are presented:

1. Epididymotomy is the logical treatment in the majority of cases of gonococcal infection of the epididymis, because this operation is based on pathological findings which are essentially surgical.
2. By the immediate relief of the severe pain the patient is rendered comfortable and convalescence is much shorter than in cases which are treated locally.
3. A very small percentage recur following epididymotomy, while the surgeon has the advantage of being able to treat the posterior urethra almost immediately after operation.
4. By the relief of tension in the early stage of the infection the prospect of sterility is minimized.
5. Early operation (within the first three or four days after the first presenting symptoms) will afford the best results.
6. In recurrent infections of the epididymis, one not only can remove a troublesome focus, but in epididymotomy, we have a valuable asset in preventing sexual neurasthenia.

Acriflavine in the Treatment of Gonorrhea. ABRAHAM HYMAN, New York, *The Urologic and Cutaneous Reivew*, June, 1920.

yman has tested out this new antiseptic in the treatment of acute gonorrhea urethritis and is quite enthusiastic about the results, especially in early cases of anterior urethritis. The report is based upon fifty-five cases.

In acute anterior urethritis, the drug is of considerable value, if the patients are seen within three to four days after the appearance of the discharge. A cure may then be expected within two weeks' time in about 50 per cent. of the cases; if no result has been obtained by this time the infection, unless complications develop, generally runs its usual course of four to six weeks. If the disease is not controlled after two or three weeks treatment, better results will then be obtained by changing to injections of protargol or argyrol.

In acute anterior-posterior infections there was not much of an improvement over the other methods of treatment in vogue, the average length of time being forty-three days to effect a cure.

In chronic anterior urethritis, the results depend more on the dilatations and urethroscopic treatments than on the flavine injections.

In complicated cases (prostatitis, vesiculitis), the results show no improvement over the drugs generally in use.

The action of flavine as an injection is not at all reliable. Brilliant results will be obtained in a certain percentage of cases, coupled with numerous failures in similar type infections. As it is extremely irritating in 1-1,000 solution after it has been used for a few days, a 1-1,500 dilution is preferable. Even though the discharge ceases within four to five days, treatment should not be suspended. The injections should be continued for eight to ten days, or relapses will be frequent. The great disadvantage of flavine is its marked staining properties, discoloring everything that it comes in contact with a bright yellow.

During the past month Hyman has discontinued the use of acriflavine in injection form, and resorted to irrigations as recommended by Watson. The results in ten additional cases have been far superior to those obtained with the more concentrated injection. Irrigations of a 1-4,000 in normal saline solution were used once daily, and in this dilution the drug is absolutely non-irritating, even when injected intravesically. Of the ten cases (8 anterior infections, 2 anterior-posterior), six were cured within two weeks time, the remaining two in three weeks. The discharge, no matter how profuse, practically disappears at the end of the first week's treatment; or becomes very scant and mucoid in character. Acriflavine in strengths of 1-6,000 to 1-4,000 in normal saline solution is the best antiseptic for irrigations in the treatment of specific urethritis.

Blood Transfusion via the Longitudinal Sinus, with Report of Cases. HARRY LOWENBURG, Philadelphia. *The Therapeutic Gazette*, June 15, 1920.

After discussing the indications for transfusion in infants, and the availability of the longitudinal sinus for this purpose, the author describes in detail the technic of the procedure. Four persons are needed to carry out the procedure successfully. Two nurses and two physicians. The infant's body is so wrapped that his limbs are immobilized. It should lie prone upon the table of such a height that the operator can work at ease while sitting. The child's head should rest firmly in the hollow of the nurse's hands. The apparatus required are one half-dozen needles of 1/16 inch bore, one 10 cc. Luer syringe, and three 50 cc. Luer glass syringes. The syringes and needles should be sterilized in a weak soda solution. The area over the fontanel is shaved and painted with iodine. The posterior angle of the fontanel is accurately located with the index finger of the left hand. The 10 cc. Luer syringe, with the needle attached, is partly filled with sterile saline solution. The tip of the needle is plunged just beneath the surface of the skin exactly in the midline in the posterior angle. As the tip enters the lumen of the sinus the fact is revealed by the appearance of blood within the lumen of the syringe. The rest of the procedure is similar to that used in the ordinary indirect transfusion by the syringe method. The author has transfused 14 children, six by the sinus method. The immediate results are startling as in most transfusions. The remote results depend upon the condition for which the transfusion is done.

Novocaine Anesthesia. Some Disadvantages from a Surgical Standpoint. G. H. C. ST. GEORGE GRIFFIN, London. *The Lancet*, May 1, 1920.

Griffin reviews in an informal way the obstacles and difficulties met when operating under local anesthesia. It might be comforting to know that other surgeons in other lands experience about the same difficulties that we do ourselves.

To operate really successfully under novocaine requires more precision, neatness, and surgical skill than under general anesthesia. A rough and clumsy operator could never succeed, except in frightening and giving considerable pain to his patient. Perhaps the most vital point to remember is the exact limits of the area of anesthesia. There are also certain characteristic minor difficulties which practice can alone render familiar. For instance, following the cutaneous incision, the underlying tissues never look normal owing to a peculiar edematous and mucoid appearance of the fat and muscle. To this may be superadded an unnatural blanching of the same structures if adrenalin is used with the novocaine solution. These masking and deceptive appearances may result in anatomical errors being made until the operator is familiar with them.

Again, the non-relaxation of muscular tissue is bound to hamper the operator both in his speed and manipulations. In reference to speed, the author's average time for a Bassini's radical cure of hernia is 15 to 20 minutes, but is increased through the difficulties already mentioned to 25 to 30 minutes under local anesthesia.

Post-Operative Complications.

1. Local Complications.—In this group reactionary hemorrhage must be mentioned. This complication was met in a small percentage of cases operated on, although the proportion was always higher than with general anesthesia. The hemorrhage was never alarming nor serious, but varied from an extensive ecchymosis of the skin around the incision to a fair-sized hematoma in the cellular planes. Reactionary hemorrhage always occurred in novocaine anesthesia to which adrenalin had been added. There are two ways to prevent the possibility of this complication: firstly, to withhold the adrenalin altogether. This is certainly the safest method to avoid reactionary hemorrhage. It is a curious fact that primary hemorrhage in the incision is far freer with novocaine alone than with a general anesthetic. The alternative remedy is to rub any probable sites of small-named vessels to promote hemorrhage with a view to applying a ligature to each unruly point discovered.

Another phenomenon that appeared in practically all the cases operated upon was a serous discharge from the incision. This usually ceased about the seventh or ninth day. In itself the discharge is unimportant as regards the future scar, except possibly when Michel's clips are used. In these wounds the cutaneous margins are approximated so closely that no serous exudation can escape. Serum collects in the field of the operation, and is further increased by osmosis from the neighboring tissues by the salts of novocaine and adrenalin remaining in the tissues after operation. The last local complication to be mentioned is the presence of intense pain in the site of the operation which comes on some hours after the operation.

2. General Complications.—Alleged insomnia was so common that it was proverbial for each patient to state next morning that he had not slept a wink. Intense headaches were also noted in a few cases. Rather severe pain was often complained of in the lumbar region, especially with inguinal operations. Thirst was frequently present during the actual operation, whereas flatulence appeared equally commonly on the following day.

Retention of urine was far commoner after novocaine anesthesia than after similar operations performed under a general anesthetic, the frequency of the retention depending partly on the roughness of the surgeon in handling the parts.

The number of chest complications under novocaine anesthesia were almost as great as those that followed general anesthesia. An interesting but curious postoperative symptom was the appearance of a definite, but slight tint of jaundice in the conjunctivæ. The jaundice set in always on the second day after the operation and occurred in at least 30 per cent of cases. It eventually disappeared at the end of the week. It never extended to the skin nor other mucous membranes. The feces were of normal color, whilst bile-pigments could never be found in the urine. The pathology of the condition requires investigating as only two similar cases followed general anesthesia.

Book Reviews

Advanced Lessons in Practical Physiology for Students of Medicine. By Russell Burton-Opitz, S.M., M.D., Ph.D., Associate Professor of Physiology, Columbia University; Professorial Lecturer in Physiology in Teachers College and the Extension Department of Columbia University. Octavo; 228 pages; 123 illustrations. Philadelphia and London: W. B. Saunders Company, 1920.

In this manual Prof. Burton-Opitz, whose text-book of physiology was recently reviewed in these columns, has prepared an outline of the experiments and demonstrations that constitute an advanced student's laboratory course in physiology. It is arranged to stimulate the student to observation and inquiry, to teach him familiarity with physiological apparatus and methods of physiological research. It constitutes a comprehensive laboratory course.

The Case History Series: Diseases of Women, including Abnormalties of Pregnancy, Labor and Puerperium. A Clinical Study of Pathological Conditions Characteristic of the Five Periods of Woman's Life. Presented in One Hundred and Seventy-three Case Histories. By Charles M. Green, A.B., M.D., Professor of Obstretrics and Gynecology, Emeritus, in Harvard University; Senior Surgeon for Diseases of Women, Boston City Hospital; Formerly Visiting Physican, Boston Lying-In Hospital; Fellow of the American College of Surgeons; Fellow of the American Gynecological Society. Octavo; 466 pages; illustrated. Boston: W. M. Leonard, 1920.

Prof. Green's book is as thorough and successful an example of the case-book system of teaching as can be found. It shows excellent judgment in the selection of illustrative cases, and gives terse yet sufficiently full resumés in the didactic introductory remarks of each chapter. It might have been wise to introduce cases illustrating the non-success of therapeutic measures occasionally and, for example, in illustrating eclampsia, to have emphasized the numerous fatalities bound to occur under any form of treatment. A certain quaint class distinction, redolent of the Boston Back Bay region of days gone by, crops out here and there, giving a not unpleasant cachet which has become rare in modern medical literature.

A Text Book of Urology in Men, Women and Children, including Urinary and Sexual Infections, Urethroscopy and Cystoscopy. By Victor Cox Pedersen, A.M., M.D., F.A.C.S., Major, Medical Corps U. S. Army; Visiting Urologist to St. Mark's Hospital, New York; Member, American Urological Association. Large Octavo; 991 pages; 362 engravings and 13 colored plates. Philadelphia and New York; Lea & Febiger, 1919

The title and subtitle of this treatise fairly indicate its purpose and its scope. While some of the affections of the bladder, ureters and kidneys are included, the greater part of the work is devoted to urethral (chiefly gonococcal) infection, its sequelae and complications. Within that sphere the work is to be commended for its painstaking thoroughness and modernity. Pathology, clinical course, diagnostic measures, therapeutic indications and methods are dealt with in detail, and proper emphasis is laid upon after-treatment and upon standards of cure. Urethroscopy and cystoscopy constitute two chapters in which these subjects are well handled. The book is well illustrated, many of the photographs being original. Figures 61 and 62 (roentgenograms) are both inverted. We note, too, here and there, errors of composition that ought to have been corrected; for example, *fenestrum* instead of *fenestra*, *mucus patch* instead of *mucous patch* (page 214). "Tendency to chronic thickenings in older cases are [*sic*] seen" (page 210.)

Although this text-book describes very briefly many of the major operations on kidney, bladder, prostate, it is not to be regarded as a work on genito-urinary surgery and, we take it, its author did not intend it so to be. He has produced, however, an extensive work on "Urology"—using the term in a sense much broader than its strict definition (urinology), but less inclusively than it is often, but incorrectly, applied.

The Nose, Paranasal Sinuses, Naso-Lacrimal Passageways, and Olfactory Organ in Man. A Genetic, Developmental, and Anatomico-Physiological Consideration. By J. Parsons Schaeffer, A.M., M.D., Ph.D., Professor of Anatomy and Director of the Daniel Baugh Institute of Anatomy of the Jefferson Medical College of Philadelphia; formerly Assistant Professor of Anatomy, Cornell University Medical College and Professor of Anatomy, Yale Medical School. Quarto; 370 pages; 204 illustrations, of which 18 are in color. Philadelphia: P. Blakiston's Son & Co., 1920.

The reviewer of this new work believes that its careful study is the duty of everyone who desires to do conscientious work in rhinology. It presents anatomic data that the specialist should learn.

A review along the usual lines would not be doing justice to the author. His aim has been to bring to the profession the exact embryology, infant and adult anatomy of a part of the body which seldom has been studied carefully. His research covers a great many years, during which time he has analyzed a number of specimens. The statements in the book are the absolute truth of anatomical observation and not the guess-work of the average specialist who founds his knowledge on clinical facts.

There is not a chapter in the book that is not worth while reading carefully. One sees opening before him the development of the various sinuses of the nose, and perhaps for the first time realizes the great difference between these parts in early childhood and in adult life. None can gainsay the importance of this knowledge. For example, the author proves to us that the antrum originates from the ethmoid labyrinth, that it is hardly present at all in early life, that the deciduous and permanent teeth lodge in this maxillary region and that any attempt to open the antrum at an early age might result in permanent impairment of the teeth. We believe that not in years has there been written a book of more benefit to the oto-laryngologist and the ophthalmologist.

Regional Anesthesia (Victor Pauchet's Technique). By B. Sherwood-Dunn, M.D., Officer d'Academie: Surgeon (Colonel) Service De Santé Militaire de Paris; Physician to the Cochin Hospital. Octavo: 294 pages; 224 illustrations. Philadelphia: F. A. Davis Company, 1920.

Professor Victor Pauchet, acknowledged to be the leading exponent of regional anesthesia in France, has advanced our knowledge of this fascinating subject to such an extent that this timely book by Dunn will be welcomed by the medical profession of America.

Local anesthesia (the infiltration of tissue with weak solution of cocain, as practiced by Réclus, Schleich and others, for over thirty years) is still of a great deal of value, particularly in operations on the nose and throat. Regional anesthesia differs from this in so far as the anesthetic is applied to the origin of the nerves, instead of to their terminals. It is injected at the point of origin of the nerves, or along the nerve trunk near the point of origin so that the whole region supplied by the nerve and its branches is anesthetized.

The book is divided into seven chapters dealing with general considerations, such as the advantages of the method; armamentarium; and the last five chapters to anesthesia of various parts of the body, such as the cranium, head and neck, thorax and abdomen, genito-urinary tract and abdomen, extremities.

The author uses procain (novocain or neocaine) in all his operations, adding twenty-five drops of a 1-1000 adrenalin solution to 200 drops of ½ per cent. procain solution. The amount of adrenalin is increased as the necessity arises.

In certain regions of the body which are often governed by several branches of nerves, supplied by different roots, peripheral infiltration is combined with root anesthesia. This applies particularly to operations on the nose and throat.

Local anesthesia is gaining greater popularity. At first it was employed mainly in the simpler operations, but apparently, if one may rely on the illustrations which accompany the text of this book, there is hardly any operation on the human body which cannot be performed more expertly this way. One of the greatest advantages, aside from the elimination of the danger and distress of general anesthesia, is the complete lack of hemorrhage.

We agree with the author that this method should not be practiced until the surgeon has learned the procedures by thorough study of the anatomy of the nerves which supply the various regions to be operated upon and has tried upon the skeleton to find the depths and angles of the emergence of the nerves.

Books Received

Lehrbuch der Chirurgie. By Prof. Dr. Carl Garré, Direktor Chirurg. Universitatsklinik in Bonn A. Rh., and Prof. Dr. A. Borchard, Berlin-Lichterfelde. Octavo; 675 pages; illustrated. Leipzig: F. C. W. Vogel, 1920.

Pathologische Physiologie Des Chirurgen. (Experimentalle Chirurgie) Ein Lehrbuch für Studierende und Aerzte. von Prof. Dr. Franz Rost, Oberarzt der Chirurgischen Universitätsklinik, Heidelberg. Octavo; 600 pages. Leipzig: F. C. D. Vogel, 1920.

The Treatment of Wounds of Lung and Pleura. Based on a Study of the Mechanics and Physiology of the Treament of Empyema. By Professor Eugenio Morelli, Assistant in the Medical Clinic of the Royal University of Pavia, Maggiore Medico, Field Hospital, No. 79. Translated from the Italian by Lincoln Davis, Formerly Lieutenant-Colonel, M. C., U. S. Army and Frederick C. Irving, formerly Major, M. C., U. S. Army. Octavo; 207 pages; illustrated. Boston: W. M. Leonard, 1920.

Diseases of the Intestines and Lower Alimentary Tract. By Anthony Bassler, M.D., Professor of Gastro-Enterology, Fordham University Medical College and New York Polyclinic Medical School and Hospital; Visiting Physician, New York Polyclinic Hospital: Visiting Gastro-Enterologist, Peoples' Hospital; Consulting Gastro-Enterologist, Stuyvesant Polyclinic, Beth-David and Christ's (N. J.) Hospitals; Fellow, American College of Physicians and New York Academy of Medicine, etc. Octavo, 636 pages; 154 text engravings and 62 full-page plates. Philadelphia: F. A. Davis Company, 1920.

Pathogenic Micro-organisms. By William Hallock Park, M.D., Professor of Bacteriology and Hygiene, University and Bellevue Hospital Medical College and Director of the Bureau of Laboratories of the Department of Health, New York City; and Anna Wessels Williams, M. D., Assistant Director of the Bureau of Laboratories of the Department of Health; Consulting Pathologist to the New York Infirmary for Women and Children. Assisted by Charles Krumwiede, Jr., M. D., Assistant Director of the Bureau of Laboratories, Assistant Professor of Bacteriology and Hygiene in the University and Bellevue Hospital Medical College, New York City. Seventh Edition. Octavo; 747 pages; 214 engravings and 9 plates. Philadelphia & New York: Lea & Febiger, 1920.

The Dawn of Modern Medicine. An account of the Revival of the Science and Art of Medicine Which Took Place in Western Europe During the Latter Half of the Eighteenth Century and the First Part of the Nineteenth. By Albert H. Buck, B.A., M.D., Formerly Clinical Professor of Diseases of the Ear, Columbia University, New York; Consulting Aural Surgeon, New York Eye and Ear Infirmary, etc. Octavo; 270 pages; illustrated. New Haven: Yale University Press, 1920.

The Accessory Sinuses of the Nose. By Ross Hall Skillern, M.D., Professor of Laryngology, Medico-Chirurgical College, Post Graduate School, University of Pennsylvania; late Lieutenant-Colonel, M. C. U. S. A.; Fellow of American Laryngological Society; Fellow of American College of Surgeons; Fellow of the American Laryngological, Rhinological and Otological Society; Fellow of the New York Academy of Medicine; etc., etc. Octavo; 410 pages; 300 illustrations; third edition. Philadelphia: J. B. Lippincott, 1920.

Pensions and the Principles of Their Evaluation. By Llewellyn J. Llewellyn, M. B. (Lond.) Late Temp. Member Appeals Tribunal Ministry of Pensions; Senior Physician and Governor, Royal Mineral Water Hospital, Bath, (attached to Second Southern General Hospital); Fellow of Royal Society of Medicine, and A. Bassett Jones, M. B. (Lond.) Temp. Captain R. A. M. C.: Military Orthopedic Hospital, Whitechurch, Cardiff; Late Senior Surgeon, Cardiganshire General Hospital; Fellow of Royal Society of Medicine. With a section on Pensions in Relation to the Eye. By W. M. Beaumont, Acting Ophthalmic Surgeon to the Bath War Hospital. Octavo; 680 pages. St. Louis: C. V. Mosby Company, 1919.

Surgical Shock and the Shockless Operation Through Anoci-Association. By George W. Crile, M. D., Professor of Surgery, School of Medicine, Western Reserve University, Cleveland; and William E. Lower, M. D., Associate Professor of Genito-Urinary Surgery School of Medicine, Western Reserve University, Cleveland. *Second Edition of "Anoci-Association."* Octavo; 272 pages; 75 illustrations. Philadelphia and London: W. B. Saunders Company, 1920.

Essays on Vocation. Edited by Basil Mathews, Medicine and Nursing. By Sir William Osler, Regius Professor of Medicine in the University of Oxford. Pamphlet. London: Oxford University Press, 1919.

Experimental Pharmacology. By Hugh McGuigan, Ph. D., M.D., Professor of Pharmacology in the University of Illinois, College of Medicine, Chicago, Illinois. Octavo; 245 pages; 56 engravings and 7 colored plates. Philadelphia & New York: Lea & Febiger, 1919.

Neither Dead Nor Sleeping. By Mary Wright Sewell. With an Introduction by Booth Tarkington. Duodecimo; 320 pages. Indianapolis; The Bobbs-Merrill Company, 1920.

The Standard Electrical Dictionary. A Complete Manual of the Science. By T. O'Conor Sloane, A.M., E.M., Ph.D. Author of "Arithmetic of Electricity," etc., etc. With addition by Prof. A. E. Watson of Brown University. Duodecimo; 767 pages; illustrated. New York: The Norman W. Henley Publishing Company, 1920.

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BONE TUMORS, BENIGN AND MALIGNANT. A BRIEF SUMMARY OF THE SALIENT FEATURES, BASED ON A STUDY OF SOME 370 CASES.*

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In the majority of cases in the roentgenogram and in the gross specimen we can recognize two main origins of bone lesions—the periosteal and the central (marrow or medullary).

It is true that some lesions primary in the marrow cavity may secondarily involve the periosteum, and the converse is also true.

This division into periosteal and central origins is of great importance from the standpoint of diagnosis and treatment.

Curability of Bone Tumors. The profession and the public should know that the true sarcoma of bone, whether periosteal or central, is rarely cured even by amputation. The failure to cure is due to early metastasis to the lung.

In 52 cases of periosteal sarcoma followed from one to many years there are but two five-year cures, or less than 4 per cent. of the total. In 36 cases the patients lived one year or less from the symptom of onset; 8 patients lived a little over one year, 3 patients lived two years, and 1 patient three years. In periosteal sarcoma, therefore, the duration of life is generally less than 18 months.

Central sarcoma is a much less frequent lesion than the periosteal—23 cases as compared with 70, in this series. Two cases of central myxosarcoma were not cured. Of four examples of fibro-spindle-cell sarcoma, two succumbed to metastasis to the lungs, and two are recent observations living less than one year. There were no cures among 7 cases of spindle-and-round-cell sarcoma and four of angiosarcoma. The best prognosis in central sarcoma of bone has been observed in the so-called bone aneurism which I have called *malignant bone cyst.* Here there are two five-year cures among six cases, or about 33 per cent.

Early Recognition. The public and the general profession must have their attention constantly called to the fact that sarcoma of bone is one of the most malignant types of tumor and that delay in the recognition and treatment of all diseases of bone leads to either death or crippling.

The most important fact to remember is the immediate employment of the x-rays for diagnosis. A child or an adult showing a slight limp, or any loss of the function of an extremity, or experiencing pain localized in a bone or joint, or discovering a slight swelling, should seek the advice of a physician at once, and the physician, before instituting any treatment, should resort to the x-ray.

After a fracture of a bone the public and the profession are educated to take an x-ray picture, but after a trauma to a bone or joint without fracture this examination is often neglected. Roentgenography after a slight trauma to bone or joint should be a routine procedure. In the first place, it will establish whether there is or is not a slight fracture. In the second place, it will demonstrate at once whether there was any evidence of disease of the bone prior to the injury. This is very important evidence in relation to the compensation laws, and, in my experience, this examination had rarely been made. In the third place, there will be an x-ray picture for comparison in those cases in which the pain and swelling after the trauma do not disappear rapidly, or recur after a quiescent period.

When I go over the records of these 370 cases observed during a period of about twenty-seven years, the early recognition of all types of bone lesions is conspicuous by its absence.

Even since the introduction of the x-rays their value as a diagnostic measure has been lost by late employment. There are only a few striking examples of early recognition due to the fact that the individual or the parents had been properly informed through public education, and to the promptness of the physician whose advice was sought.

Concerning what effect early recognition will have on the curability of periosteal and central sarcoma of bone, we have, as yet, not sufficient evidence to make any definite conclusions, but we have every evidence that a delay of days or weeks may be associated with metastasis to the lungs.

Although there is evidence that the x-rays, radium and Coley's serum have a retarding, or even a curative, effect on the local growth, we have no evidence of the same effect on the metastatic growth in the lungs. Unless these agents are found capable of destroying the metastatic nodules in the lung, they can add but little to our curative treatment of the true sarcoma of bone. The sentence, therefore, that expresses what the public and profession should know about bone lesions, is: Immediate *x*-ray examination after a slight trauma or any symptom of onset which would suggest a lesion of a bone or joint.

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*Read before the New York and New England Association of Railway Surgeons at New York, October, 1919.

Diagnosis. In view of the evidence that few cures are accomplished by amputation for true sarcoma of bone and of the fact that many periosteal and central lesions which may resemble the true sarcoma in the roentgenogram are benign, or relatively so, *amputation should never be performed until the diagnosis of malignancy is established.* In many cases an exploratory incision will be necessary to establish this diagnosis.

Fig. 1 (P. No. 24682) is a roentgenogram of a tumor involving the hand. It shows almost complete destruction of the metacarpal bone of the ring finger. This patient was an adult, aged about twenty-five years, a chauffeur, and the swelling had been present about four months. This swelling had all the appearance and feeling of a malignant tumor—the veins were dilated, the skin apparently edematous, the tumor boggy and fluctuating. A diagnosis of sarcoma was made from the roentgenogram and clinical picture, and the arm was amputated without an exploratory incision. Fig. 2 (24682) is the photograph of a longitudinal section through wrist and hand. It shows that the tumor was distinctly localized, almost encapsulated, in the region of the destroyed metacarpal bone. Microscopically, the tumor was of the giant-cell type. This tumor could easily have been removed locally with the cautery, sacrificing the middle finger only. The other tendon-sheaths were not involved; the metacarpal bone of the index finger was partially destroyed by pressure and not by infiltration, and could have been saved. The carpal bones were not involved.

I have reported a somewhat similar case in *Annals of Surgery,* April, 1919 (Figs. 1 to 19), in which the arm was saved by resection of the tumor.

In this case (Figs 1 and 2) the surgeons and the roëntgenologist, notwithstanding their diagnostic experience and ability, were apparently ignorant of the small probability of a cure in true sarcoma of bone and of the large probability that in spite of the clinical and *x*-ray picture, the lesion might have been a bone tumor of lesser malignancy, or even benign.

In the first place, maliginant tumors of the metacarpus are rare; in the second place the giant-cell tumor may completely destroy the bony capsule and give a clinical and *x*-ray picture of the most malignant type of sarcoma of bone, and yet not be associated with any malignancy in the sense of a local growth beyond excision or with metastasis to the lungs. This point was brought out in the paper referred to.

Amputation without positive diagnosis of true sarcoma is, therefore, not justifiable.

It is important to amplify this statement, or I may be misunderstood. In a few cases of periosteal sarcoma the *x*-ray is so distinctive that the diagnosis can be made from the *x*-ray only, and amputation can be done if the lungs show no metastasis. In my opinion this should be the operation of choice in true periosteal sarcoma of the femur and upper end of the tibia, because resection with bone transplantation rarely gives such a serviceable limb as the artificial.

In cases of this kind one should consider treatment with Coley's serum, *x*-ray or radium. However, the evidence which I have at hand influences me to advise immediate amputation.

In true periosteal sarcoma of the lower portion of the tibia and fibula which is still well localized, resection—giving the disease a wide margin—and transplantation of bone should be the operation of choice.

In periosteal sarcoma of the upper extremity where local resection and bone transplantation are ruled out because of local growth, it is a question whether Coley's serum, *x*-ray or radium should not be tried first, for the loss of an arm is so great a mutilation, and the probability of a cure is so remote. Personally I have no record of a true periosteal sarcoma of the upper extremity cured by amputation.

In central bone lesions, in my opinion, amputation should never be performed without an exploratory incision. In some cases, where the tumor can be easily removed by resection followed by bone transplantation, with a large promise of a serviceable extremity, the resection may be performed without exploratory incision, if one can rule out a bone cyst, tuberculosis, and the giant-cell tumor for which curetting would be the operation of choice.

We may summarize this by stating that no mutilating operation should be performed for a bone lesion of either extremity without a positive diagnosis, and one should never hesitate to make an exploratory incision for careful inspection of the gross appearance and microscopic study. If the surgeon is not prepared to act himself on this diagnosis, the wound can be disinfected with the cautery, pure phenol and alcohol, or a 50 per cent. solution of chloride of zinc, and the tissue sent to a competent diagnostician for advice.

In view of the facts already stated, this is a less harmful procedure than amputation or mutilating excision without a positive diagnosis.

In two of the four cured cases reported here pieces had been excised for diagnosis and there was an interval of two weeks and of one month before the amputation. One was a periosteal sarcoma of the upper end of the tibia, and the other a central sarcoma of the lower end of the femur of the malignant bone-cyst type.

I also have numerous cases where the excision of a piece of tissue for diagnosis has saved the patient from amputation or an unnecessary resection.

Clinical History. The facts in the history which are most helpful in the diagnosis are the age of onset, the duration of the symptons, the symptom of onset, the character of the pain, the exact data as to trauma and fracture in relation to the symptom of onset and the later symptoms, and, most important, whether the lesion is single or multiple; the exact location of the single or multiple lesion should be recorded.

The tremendous discussion in regard to focal infection in relation to joint lesions or so-called "rheumatism" has, on the whole, obscured the vision of many diagnosticians to the fact that bone and joint lesions, even when multiple, may be primary in their origin and have no relation to the readily demonstrable focal infection in the tonsils, sinuses or teeth, and precious time in some cases has been lost because of this point of view.

Examination. The most important examinations are by x-rays of the involved area and of the chest. It is also important to x-ray the other bones, because the demonstration of multiple foci practically excludes sarcoma.

The next most important step is the Wassermann blood test, then the test of the urine for Bence-Jones bodies. The demonstration of the latter favors multiple myeloma—a hopeless disease, or some other multiple lesion of the skeleton. I have no records of the presence of Bence-Jones bodies in a case of primary sarcoma of bone. Although, of course, the complete blood count should be made, it is rarely helpful, except in pyogenic osteomyelitis, where an increase in the leucocytes and in the per cent. of polymorphous type would be a very helpful finding. But this blood change is not always present in those rare cases of chronic osteomyelitis which in the x-ray picture suggest a central or periosteal sarcoma.

The palpation of a tumor, especially in the early stages, is not always distinctive. Syphilitic periostitis cannot be distinguished from periosteal sarcoma by palpation. The palpation of the shell of bone in central lesions is not diagnostic, nor is the partial or complete destruction of the bony shell a positive sign of malignancy. As has already been stated, this destruction of the shell may be present in the giant-cell tumor.

The case illustrated in Figs. 1 and 2 and the one reported by me in the *Annals of Surgery*, already referred to, demonstrate that the central giant-cell tumor may have all the appearance, at examination, of a most malignant sarcoma. Of all the bone tumors the one that has the most distinctive characteristics on palpation is the exostosis. But even in a case of this kind the palpable bone shell may conceal myxomatous tissue. Myxomas of bone will be discussed later.

Age of Onset. This is helpful in the diagnosis of a central lesion, but not at all in the periosteal.

In central bone lesions, in which the age of onset is 15 years or less, the predominant tumor is the benign bone cyst, and a few cases of central giant-cell tumor (26 to 4). No central sarcoma has been observed with an age of onset less than fifteen. Therefore, if the x-ray shows the shadow of a small central lesion in an individual fifteen years of age or less, delay is justifiable (Fig. 3). If the lesion is a cyst, one would observe quickly signs of ossification; if this was not observed, one should explore to differentiate the giant-cell tumor from the bone cyst, and at the same time be on the lookout for the very rare myxoma.

Between fifteen and twenty bone cysts still predominate, but central sarcoma must be considered, and for this reason exploration for diagnosis should in the majority of cases, be performed at once. Between fifteen and twenty we have records of 12 cysts, 2 giant-cell tumors and 5 central sarcomas. The predominant age of the giant-cell tumor is from twenty to thirty-five. Bone cysts are very rare after the age of twenty. The giant-cell tumor has been observed from the age of two to seventy; the central sarcoma from sixteen to seventy; the rare myxoma from five to seventy; the still rare central chondroma from twenty to fifty.

The two most common types of periosteal lesion —the benign exostosis and the true and very malignant periosteal sarcoma have been observed at all ages from five to seventy.

We have never observed a malignant bone tumor of congenital origin. The exostosis, usually multiple, is the most frequent lesion of apparently congenital origin. I have one case of bone cyst of apparently congenital origin.

Age, therefore, is helpful only as a pretty positive diagnostic sign in central bone lesions in patients under the age of fifteen.

Duration of Symptoms. Among central tumors the bone cyst has come under observation most quickly after the symptom of onset. This is due to the fact that the first symptom is a pathological fracture, and an x-ray picture is taken which reveals the lesion. Sixteen cases came under observation between one day and one month. One case of malignant cyst of the lower end of the femur, in which a roëntgenogram was made immediately after the trauma, was recognized by repeated x-raying within one month after the trauma and subjected to exploration and amputation within three weeks after the shadow of the tumor was first seen. This patient is well now (1920) almost four years. There is also one case of central chondroma which was operated on within one month after the symptom of onset.

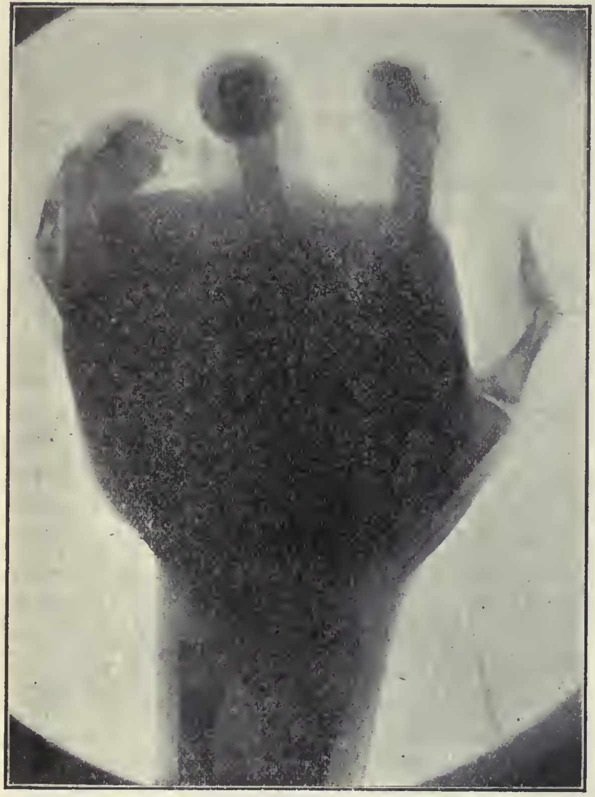

Fig. 1—Pathol. No. 24682. Giant-cell tumor of middle metacarpus, diagnosed clinically and from the x-ray sarcoma. Amputation of forearm without exploration (see Fig. 2).

If the symptoms have been present more than one year and there is no evidence of metastasis in the lungs, central sarcoma will rarely be observed. There are, however, sufficient exceptions to this rule of allowing the duration of more than one year to exclude the malignant lesion. Seven cases of malignant central sarcoma gave a history of definite local symptoms of from one to five years. If the central lesion has been present longer than five years, it is pretty positive evidence of a bone cyst, a central chondroma or a myxoma.

I have already stated that in periosteal sarcoma the majority of cases died within eighteen months after the symptom of onset. For this reason, if the periosteal lesion has been present more than one year and the x-ray shows no metastasis to the lungs, this evidence is rather against a malignant tumor, but there is sufficient evidence in a few cases of longer duration without demonstrable metastasis to the lungs, not to allow this duration of the symptoms to exclude the malignant tumor.

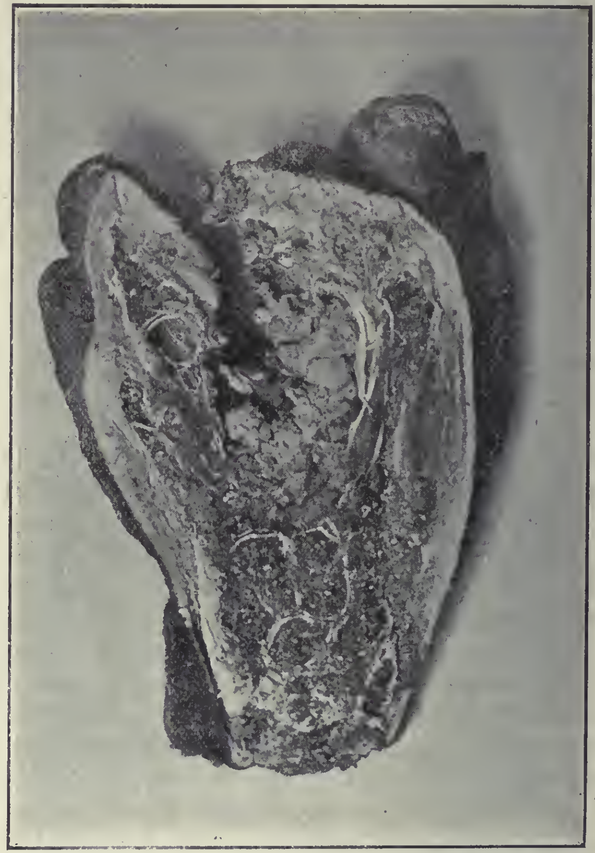

Fig. 2—Pathol. No. 24682. Giant-cell tumor of middle metacarpus. Photograph of longitudinal section through hand and wrist to demonstrate that tumor was localized and could have been removed by sacrificing the middle finger only.

In the future, it is to be hoped bone lesions will present themselves so quickly after the first symptom that the comparative length of the duration of symptoms will not be particularly helpful, unless the lesion has been present more than five years.

Symptom of Onset. The striking feature is that a pathological fracture is the symptom of onset most frequently in the benign bone cyst. It has never been observed as the symptom of onset in the central giant-cell tumor, or the central sarcoma, nor in the periosteal sarcoma. Pathological fracture after some other symptom is also most frequent in the benign bone cyst, next in the central sarcoma. It has been observed but once in the giant-cell tumor and once in the periosteal sarcoma. The predominant symptom of onset in all bone lesions is localized pain. Rarely is pain absent in periosteal sarcoma. Swelling is more frequently a symptom of onset in periosteal sarcoma than in central.

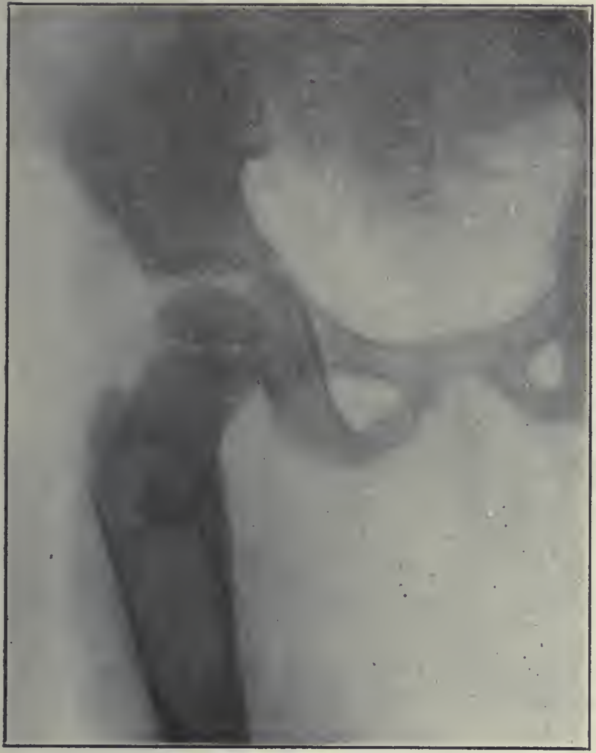

Fig. 3—Pathol. No. 24009. Benign bone cyst of upper end of femur. Third roentgenogram six weeks after the first, shows beginning ossification. First observed April, 1919.

White, male, aged 5 years; trauma 20 months, no fracture; pain and limp one month. The father of the patient knew the importance of immediate *x*-ray examination after pain or limp.

This patient is well June, 1920, one year; no operation; treatment; rest in bed for six weeks.

When we tabulate the study most carefully the symptom of onset and the sequence of symptoms—pain, swelling, pathological fracture, limp, arthritis—we find nothing particularly helpful in the diagnosis, except the fact already stated that if the patient falls, sustains a fracture and the *x*-ray shows a central lesion, and there have been on symptoms previous to this, and the patient's age is under twenty, we know that, with few, if any, exceptions, we are dealing with a benign bone cyst.

The important point to remember is that in every bone lesion the patient is warned by some definite local symptom sufficient, if the patient is informed, to urge him to seek the advice of a physician who must immediately resort to the *x*-ray.

In a few instances the single bone tumor has been associated with polyarthritis with a demonstrable focus of infection, but in these cases the *x*-ray at once discovered the local lesion which apparently had no definite relation to the polyarthritis. In some of the older cases and, in fact, even in some of the more recent, the arthritis had been treated without the employment of the *x*-rays for diagnosis.

Trauma. The most predominate etiological factor in both periosteal and central lesions, is the history of a trauma, but as we have few, if any *x*-ray studies of the bone previous to the trauma or immediately after it, we cannot exclude the possibility of the lesion having been present before the trauma.

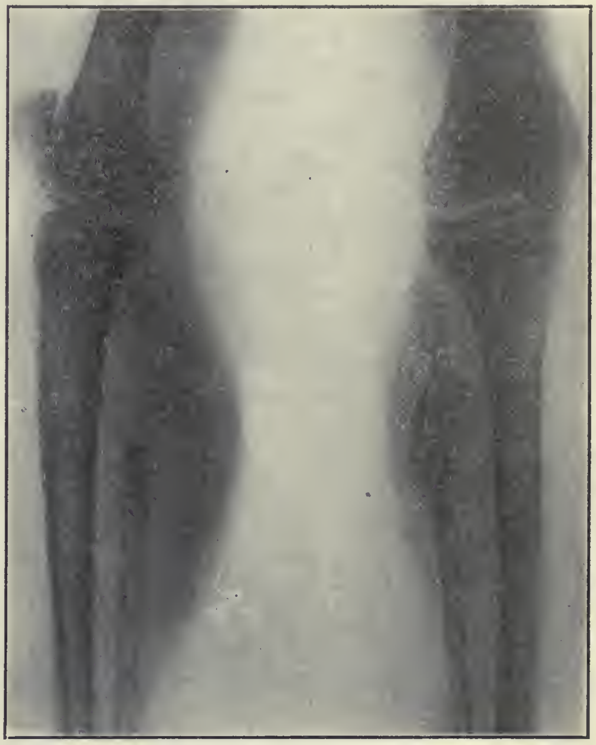

Fig. 4—J.C.B. No. 9771. Periosteal sarcoma of upper end of fibula. This *x*-ray picture is sufficiently typical to allow a diagnosis of the most malignant type of bone sarcoma without exploratory incision. The *x*-ray examination of the chest shows metastasis. Patient of Drs. Moore and Rogers of Florida.

White, male, aged 15 years; localized pain in leg three months; swelling two months; loss of weight; secondary anemia.

I have one case in which we have *x*-ray evidence apparently excluding the presence of any bone lesion, while the *x*-ray about one month later showed the central lesion in the outer condyle of the lower end of the femur. This case would seem to show that trauma may be the cause of a sarcoma.

Not until *x*-ray pictures are made as a routine immediately after a slight trauma to the bone will we be able to demonstrate definitely the relation between trauma and bone tumors.

In bone cysts and ostitis fibrosa the evidence is rather against trauma as an etiological factor, because in so many of these cases the x-ray picture is taken immediately after the injury because of the signs of fracture and a marrow shadow of such size is portrayed that we must conclude that the lesion was present before the injury. The evidence is also against trauma as an etiological factor in chondroma and myxoma. However, in the periosteal sarcoma and in the central giant-cell tumor and sarcoma trauma as an etiological factor is very suggestive.

Fracture. As pathological fracture is a common symptom of onset in bone cysts, we would expect it to be observed frequently in the history. Among 54 cases of bone cysts there was a history of fracture in 14: pathological fracture at onset in 10, pathological fracture later in 3—a definite fracture, therefore, in 27 cases, or more than 50 per cent. In 52 cases of central giant-cell tumor there is a history of fracture in 4, pathological fracture in 1. In 16 cases of central sarcoma there is a history of fracture in 2, pathological fracture in 2—4 cases or 25 per cent. In the central malignant bone cyst there is a pathological fracture in but one case.

By "a history of fracture" I mean that the patient remembers a fracture at the present site of the tumor, but as no x-ray picture was taken we are unable to determine whether it was a pathological fracture or not. In the periosteal sarcoma, among 70 cases there are but three fractures—2 distinctly pathological, one a history of fracture.

In view of the common occurrence of fracture the evidence, therefore, is against fracture as an etiological factor in bone tumors, benign and malignant.

Significance of Fracture. If the patient is under twenty and the fracture occurs with or without previous symptoms, such as pain, swelling, or limp, and the x-ray shows the shadow of a central lesion, this evidence is in favor of a bone cyst. If, on the other hand, the patient is over twenty years of age, the evidence is suggestive of a central sarcoma of a more malignant type and helps to rule out the more common central sarcoma.

Ossification After Fracture. We have definite x-ray evidence that complete healing of a fracture takes place if the central lesion is a bone cyst, but in the other types of neoplastic central lesions in the cases personally studied by me I have no x-ray evidance of definite healing of a pathological fracture associated with a central lesion other than the bone cyst.

In the giant-cell tumor there is a history of fracture in 4 out of 52 cases, and the fracture healed. But as we have no x-ray pictures at the time of the fracture, we cannot with any certainty come to a conclusion whether the disease was present at the time of the fracture or not.

In 16 cases of the malignant central sarcoma there is a distinct history of fracture with healing, but no x-ray studies at the time of the fracture.

In the older literature I have frequently found the statement that fracture in a bone the seat of malignant sarcoma may ossify, but I can find no x-ray proof.

In the periosteal sarcoma there is a history of fracture once and pathological fracture twice, that is, in over 70 cases only 3 fractures. Fracture in periosteal sarcoma is therefore rare and a camparatively late occurrence.

In periosteal sarcoma the shaft of the underlying bone may be completely destroyed, as shown in Fig. 4 (JCB 9771), but no clinical fracture takes place, because of the support of the surrounding periosteal growth, or because, on account of the pain, the individual does not use the extremity much.

In syphilis, tuberculosis and pyogenic osteomyelitis, fracture is unusual, of late occurrence, and, in the cases which I have observed, has been of no diagnostic importance, nor has its presence made the recognition of the inflammatory lesion difficult.

X-ray Examination. I have recently and with great detail discussed the difficulty of a diagnosis based on the x-ray examination only, and this is to be published shortly in the *Journal of Radiology*. I have already referred to this point in this paper. It may be briefly presented as follows:

From my records, especially in the past few years during which time the number of earlier cases has increased, more mistakes have been made by experienced roëntgenologists than in previous years.

It is true, as I have stated before, that in some cases of periosteal sarcoma the shadow of the periosteal growth, especially of the bone formation and of the destruction of the shaft beneath, is so characteristic that a positive diagnosis of periosteal sarcoma has been made. In this group there are no mistakes. In other cases, however, the shadow of the periosteal lesion and of the bone destruction has been atypical and many mistakes have been made. The most common in recent years has been the diagnosis as chronic osteomyelitis of a lesion which later proved to be periosteal sarcoma with involvement of the shaft; less frequently syphilitic periostitis has been diagnosed periosteal sarcoma.

More mistakes have been made in the diagnosis of central lesions. Tuberculosis confined to the marrow with the preservation of the bony shell has been diagnosed central sarcoma. Central giant-cell tumors with partial or complete destruction of the bony shell have been considered from the *x*-ray plate to be malignant central sarcoma. Bone cysts and solid ostitis fibrosa have been diagnosed giant-cell tumor or sarcoma. One case of malignant bone cyst in the lower end of the femur was looked upon and treated two years as chronic arthritis of the knee.

At the present time, especially in early cases, there is apparently too large an element of error, even among most experienced roëntgenologists, to allow the differential diagnosis to rest upon the *x*-ray picture.

X-raying Other Bones and the Chest. I have already called attention to the importance of this. The roëntgenogram of the chest may show definite metastasis. Up to the present time in all recent cases in which the plate of the chest has shown metastasis, the primary bone tumor has been periosteal with a definite *x*-ray picture. A positive *x*-ray find in the chest is, therefore, of great importance in the diagnosis of malignancy, but a negative plate does not exclude malignancy.

When the *x*-ray shows lesions in other bones, this practically excludes primary central or periosteal sarcoma. This type of sarcoma does not metastasize to other bones but to the chest.

When the *x*-ray shows multiple lesions of the type of exostoses, the diagnosis presents no difficulties. This has been called *multiple* exostoses. The disease is probably of congenital origin.

When we find multiple periosteal lesions of a type different from the exostoses and one or all the lesions suggest a periosteal sarcoma, we can be quite certain that we are dealing with syphilis. Periosteal lesions involving the os calcis on both sides, in our experience with over 13 cases, have always been benign and due either to trauma or a gonorrheal infection.

Multiple central lesions suggest first bone cysts or ostitis fibrosa. In two of my cases with small bone cysts in the shaft of the femur further *x*-ray examinations revealed a small cyst in the shaft of the fibula in one case, and in the upper end of the tibia in a second case, in both cases on the same side as the lesion in the femur. In one of these cases no operation was performed, and the followed patient has remained well many years with complete ossification of the fracture and both cysts. In the second case the cyst in the shaft of the femur was explored, and the clinical and *x*-ray diagnosis confirmed. Today I should not subject this patient to operation. Bone cysts or ostitis fibrosa as a multiple disease of the skeleton have been observed by me in only 2 out of 54 cases. In the remaining 52 cases there were two or more cysts in 4 instances, but as all were not subjected to complete *x*-ray examinations of the skeleton, we do not know the total number of multiple cysts. However, in a few cases the entire skeleton has been examined by the *x*-rays with the demonstration that at least at the time of the examination the bone cyst was single.

Tuberculosis now and then may show multiple central lesions not unlike the bone cyst.

Primary malignant tumors outside of bone may metastasize to bone and, at the time of the examination, in a few cases only one bone may be involved. In my experience it has always been a central lesion, and the picture has been distinctly different from primary central lesion. This difference is very characteristic in that there is bone formation as well as bone destruction in the central shadow. This I have never observed in primary central tumors, except in the healing bone cyst.

As a matter of fact in metastatic bone lesions difficulties of diagnosis were encountered in only 3 out of 21 cases. Two were associated with undiagnosed cancer of the prostate; in one of the bone lesion in the shaft of the tibia, in the other in the metatarsus. In neither of these cases had the patient been subjected to modern urological examination. In the third case the bone lesion involved the upper end of the humerus; roëntgenagraphicaly it was very characteristic of a metastatic process. Clinically, the patient had a huge liver. This patient died later and, as there was no autopsy and no operation on the bone, there was no opportunity to make a confirmatory diagnosis.

In addition, in metastatic bone lesions the history of the primary neoplasm is usually distinct. In our list of cases cancer of the breast predominates, then cancer of the prostate, in a few cancer of the thyroid, then one or two examples of neoplasms elsewhere.

Syphilis. In all my personally observed cases, except one, the Wassermann reaction has been positive and the change in the periosteal lesion, multiple and simple, after the older treatment with iodids and mercury, or by some form of salvarsan intravenously, has been so rapid that the diagnosis gave no difficulty. In this group there are a few cases diagnosed sarcoma from the *x*-ray pictures. In one case the diagnosis of periosteal sarcoma was made not only from the *x*-ray picture, but also from a piece excised for microscopic examination. In this case the patient had been treated with Coley's serum, and later amputation was advised because there was no improvement. The one examination which had been neglected was the Wassermann test.

Some years ago at a clinic in another city to which I had been invited, one of the cases brought in for operation had been diagnosed periosteal sarcoma of the tibia and amputation through the thigh advised. The Wassermann report was negative. The *x*-ray picture was not typical of periosteal sarcoma, but suggested either periosteal sarcoma with involvement of the shaft, syphilis or osteomyelitis. For this reason I refused to amputate, advised salvarsan, and this patient is well today.

In all of the cases of true periosteal or central sarcoma and in all of the cases of giant-cell tumor in which a Wassermann test was made the report was negative. In one case of bone cyst the Wassermann report was positive. For this reason a positive Wassermann reaction does not exclude a non-syphilitic bone lesion, but in my experience salvarsan intravenously will show within ten days a definite change in the syphilitic lesion. In a few cases in which it has been tried for the non-syphilitic lesion there has been no effect which could be read in the *x*-ray picture.

Bence-Jones Bodies. My experience with this finding in the urine is limited to one case. Here there was a history of pain in the region of the outer third of the right clavicle for some months. The patient was treated for rheumatism. Then there was swelling, then an *x*-ray examination showed an expansile, central tumor of the outer third of the clavicle with preservation of the bony shell. This was many years ago. The picture was submitted to many roëntgenologists and surgeons, and every possible diagnosis was made. No one suggested examination of the urine. After the tumor had been removed and examined in a frozen section, its histological picture was so different that the urine was examined and Bence-Jones bodies found. At that time I was familiar with multiple myeloma, but it had never occured to me that it could present itself as a single bone lesion, nor has a similar case been observed since.

Having missed my first opportunity to reveal the nature of an obscure bone disease by an examination of the urine for Bence-Jones bodies, I have never failed since to have this examination made. But up to the present time Bence-Jones bodies have not been found. In spite of the rare occurence of myeloma, one should always think of it in bone lesions and never fail to examine the urine. Multiple myeloma is a progressive, hopeless diseases of the skeleton, and as a rule the lesions are multiple when they come under observation.

Blood. I have already stated that this examination is of little importance outside of the Wassermann test.

Palpation of the Tumor. I have nothing to add to the brief preliminary note, except to emphasize that in certain rare forms of tuberculosis and osteomyelitis confined to the marrow there may be no change in the soft parts, and in periosteal sarcoma or in central sarcoma with perforation of the bony shell and the formation of a periosteal tumor, there may be a local condition of the soft parts not unlike an inflammatory process, and even abscess formation.

CLASSIFICATION OF CENTRAL PRIMARY BONE TUMORS.

Bone Cysts (Ostitis Fibrosa)	54 cases.
Central Giant-Cell Tumors	48 cases.
Central Sarcoma	25 cases.

Types of Central Sarcoma.

Myxo- and -Chondrosarcoma	2 cases.
Fibrosarcoma	4 cases.
Various forms of Spindle-and-Round Cell Sarcoma	7 cases.
Angiosarcoma	4 cases.
Malignant Bone Cysts (Bone Aneurism)	8 cases.
Central Chondroma	4 cases.
Central Myxoma	8 cases.

This is a very important table, because it demonstrates that given the *x*-ray evidence that the lesion is central the probabilities are that it is benign (106 cases: cysts 54; giant-cell tumors, 48; chondroma, 4). As compared with these 106 cases there are 25 central sarcomas all of which must be considered malignant and 8 central myxomas which must be treated as a malignant tumor. That is, the probabilities of benignity are as 106 to 33.

As stated before, if the patient is under fifteen years of age, we need consider only the bone cyst and the very rare myxoma. If the patient is older all other central tumors must be considered.

The cases of tuberculosis which gave in the *x*-ray pictures suggestions of a central bone tumor number only three, and those of chronic osteomyelitis four.

CLASSIFICATION OF PRIMARY PERIOSTEAL TUMORS.

Exostoses, benign	110
Periosteal Chondroma	8
Periosteal Myxoma	8
Periosteal Sarcoma, malignant	70

As stated before, the exostoses is a very distinct lesion, roëngenographically. The only thing to remember is the possibility of myxomatous tissue being present in the osteochondromatous exostosis.

This has been observed once in 110 cases, in which from every other standpoint, except the miscroscopic, the periosteal tumor was a benign exostosis. In this case the failure to recognize the presence of myxomatous tissue led to local recurrence and the death of the patient.

The periosteal myxoma and chondroma, with the exception of the one case noted, are quite different in the x-ray picture from the benign exostosis on the one hand and the malignant periosteal sarcoma on the other. The important point in this group is to remember the possibility of myxomatous tissue.

In the periosteal sarcoma, as already noted before, we must bear in mind, first, the possibility of syphilitic periostitis. I have some 30 or more cases for differential study. Non-syphiltic periostitis resembling periosteal sarcoma has been observed only once, and in this case, had the patient consented to amputation, the limb would have been removed unnecessarily. This observation is reported in detail in the *Journal of Radiology.*

LOCALIZATION OF BONE TUMORS.

After a most painstaking tabulation of all these cases according to the localization of the tumor, I am not prepared to state that localization is very helpful for diagnosis. The following, however, is a brief summary of the more striking facts.

The common localization of both periosteal and central lesions is in the long pipe bones. The bones of the skull, with the exception of the upper and lower jaws, and of the small pipe bones, the vetebrae and the carpus and tarsus are rarely involved. When the small pipe bones of the hand and foot and carpus and tarsus are involved the lesion is very rarely sarcoma. Here one should constantly think of myxoma.

I do not consider in this paper tumors of the jaws, which are grouped separately.

The bone lesions of the long pipe bones predominate at the positions of greatest trauma—lower end of femur, upper end of tibia, upper end of fibula, upper end of humerus, lower end of radius.

Of the bones of the foot exostosis of the os calcis predominates.

It is difficult to explain why more than 90 per cent. of bone lesions of the lower end of the radius are central giant-cell tumors, and why central giant-cell tumors have never been observed, in my list of cases, in the humerus.

It is also difficult to explain why the central tumor of a phalanx, metacarpus or metatarsus is usually a myxoma.

Undoubtedly, one would have to have a much larger number of cases for tabulation as to localization before attempting any conclusions or establishing any diagnostic data on this basis. Nevertheless the knowledge of the possible benign and malignant lesions in each bone and in different parts of the same bone is interesting and, to a certain extent, helpful in the diagnostic study.

PREVIOUS COMMUNICATIONS BY THE AUTHOR.

Annals of Surgery, August, 1910: Bone Cysts, Ostitis Fibrosa, Giant-Cell Tumors, Bone Aneurism. 43 illustrations and literature.

Annals of Surgery, August, 1912. Conservative Treatment of Giant-cell Tumors; Bone Transplantation. Literature on Giant-cell Tumors.

Annals of Surgery, April, 1919. Giant-cell Tumors. Destruction of Bone Shell or its Perforation Not a Sign of Malignancy. 25 illustrations.

Transactions of the Medical Association of the State of Alabama, April, 1919. Brief review of benign and malignant bone cysts. 20 illustrations.

Journal of Radiology, (to be published). *X*-ray Diagnosis of Bone Tumors. 89 illustrations.

LOCAL ANESTHESIA IN ABDOMINAL SURGERY.*

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During recent years, indications and demands for local anesthesia have steadily become more and more recognized until now, in some fields of surgery, the method has approached its just recognition, and secured the adoption it deserves. But for the reason that the profession has been less prone to make use of local anesthesia in abdominal surgery, I take occasion to draw attention to its use in this special field.

In the light of our present knowledge we are justified in the statement that it is possible to perform a large amount of surgical work under local anesthesia, but we must not lose sight of the fact that a certain knoweldge of technic and certain operative methods must be adhered to. The following is not only essential, but imperative, for the execution of a satisfactory operation attempted in the abdomen under local anesthesia. By a satisfactory operation we mean one without pain, and one in which there is relaxation of tissues and mind. The operation attempted under local anesthesia, with the patient strapped on the table, crying with pain, has no place in our modern operating room.

The essentials to success are: first, time. (The too busy, impatient, irritable surgeon who has but ten minutes for an appedicectomy, or an hour for a hysterectomy, has no place in local anesthesia.)

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*Read before the Georgia Medical Association, April, 1920.

Second, a trained and well organized operating staff. Third, an accurate knowledge of the anatomical field, with special reference to nerve supply. Fourth, feather edge dissection, with the gentlest manipulation of tissues. Fifth, a proper understanding of method of administration and action of drugs for producing local anesthesia, the best of which are solutions of procain (novocain). Too often have we seen those attempting local anesthesia display absolutely no knowledge of the proper use or action of local anesthesia. It takes from ten to twelve minutes for novocain to have its maximum effect on tissues, hence if the knife is grasped as the syringe is returned to the tray, we may expect pain.) Sixth, control of the patient. It is impossible to accomplish successful local anesthesia without adhering strictly to the above principles, so fundamental in the execution of this technic.

We hope to show that in the technic described below, while it employs local anesthesia, we fulfill, in a large measure, the demands outlined by Crile in his notable animal experimentations. Through the amnesia produced by liberal doses of scopolamin and morphine, is eliminated largely psychic shock. Through nerve blocking and infiltration anesthesia, is eliminated traumatic shock. By the use of feather edge dissection combined with a careful manipulation of the tissues, so imperative in a successful operation under local anesthesia, is reduced to a minimum the number of instances of infection, hence eliminating to a large degree the element of septic shock. With these and the small amount of post-operative discomfort the following local anesthesia, we fulfil in a large measure the indications of Crile, in his efforts to produce a wholly shockless anesthesia.

Up to date we have performed under local anesthesia fifty-one abdominal operations, eighteen of which have been previously reported. The remaining thirty-three consist of:

18 cases of chronic and acute appendicitis,
4 cases of gastroenterostomy.
2 cases of drainage in generalized peritonitis,
4 cases of cholecystectomy,
2 cases of cholecystotomy,
2 cases of exploratory laparotomy, one in which a sigmoidostomy was done for inoperable carcinoma of the transverse colon,
1 case of hysterectomy.

The indications for local anesthesia have been the usual causes contraindicating general anesthesia, namely: senility, cardio-renal diseases, myocarditis, debility, hemorrhage, shock, and by request.

The technic is as follows: When practical, the patient for operation is put to bed two days previous, being given soft diet and eliminative treatment. We believe that the degree of success of local anesthesia in abdominal surgery depends in a large measure on the preparation of the alimentary canal. If the intestine is not well emptied, the tension will prove troublesome in closing. The day before operation the patient is given the usual preparations, with the exception that in all but the stomach cases, liquid diet is continued until two hours before operation. One hour before operation a hypodermatic injection of morphine, gr. ¼, with scopolamin, gr. 1/100 is administered. One half hour before operation the patient is seen by the operator, and a second dose of morphine and scopolamin, one-half the original, is given or not, depending on the degree of amnesia produced by the first dose. At this time the patient's eyes are ordered bandaged, his ears are stopped, and he is placed on an operating table in the anesthetizing room. The table has been made comfortable, being padded with pillows, or better still, air cushions. Such doses of morphine and scopolamin produce a mild amnesia, eliminating psychic shock, and adding materially to the comfort of both patient and operator. In no instances have we noted bad results from these drugs given in such doses, when administered under the careful supervision of the operator, and in no instances have we seen the patient excited or vomiting from nausea.

When everything is ready and in order, the patient is rolled to operating room. Perfect order must be insisted upon, but unless the patient is sound asleep, conversation in subdued tones is preferable to silence, as the sound of the instruments in a death-like stillness often has a tendency to excite the patient. The patient is now placed in a semi-sitting position. In this position he is much more comfortable, and there is brought about a relaxation of the abdominal muscles materially lessening tension of the wound edges, a precaution which is productive of much good.

For anesthesia we have used routinely procain (novocain) in two solutions; for the skin and conduction, 1%; for infiltration, 1:400. We have used these solutions in unlimited amounts, at times as much as 20 to 30 oz., and in no instance have we noted bad results. We have in all cases made use of a rectus incision, either splitting the fibers of the muscle, or dislocating the belly of the muscle to the outside. We believe this to be the incision of choice, for the reason that it permits of an easy and free incision, resulting in less tension on the wound edges and less traction on the mesentery, at the same time insuring good closure, which are three essential factors to be much considered. For infiltration we have used both methods of injection: the perineural, or nerve blocking, and infiltration in the line of incision. (In two recent cases we have preceded the usual injections by a circular injection of the field of operation, involving the skin and subcutaneous tissue. This was done in an effort to block and completely eliminate the vibratory sense, a sensation bitterly complained of by a recent patient. There was experienced no sensation of pain, but a sensation as being thumped or pressed upon, each time a ligature was tied. This resulted in considerable annoyance to the patient, and had a tendency to make her become rather nervous.) Next, with a long needle the outer edge of the rectus sheath is blocked the entire length of incision. This is accomplished by the injection of 5 cc. of solution in the outer edge of the rectus, at one inch distances. By this time, perfect anesthesia has occurred in the line of incision.

The skin and subcutaneous tissues are opened down to the rectus sheath, and at this stage the rectus sheath and muscle are infiltrated in the line of incision. While anesthesia is taking place, wound towels are placed, being careful to fix clips in the subcutaneous tissue and not the skin, and any bleeding vessels in the edge of the wound may be tied, special care being taken to avoid undue trauma. Special care must also be taken in opening the rectus sheath to prevent injury to the large nerve trunks, and in case they are encountered they must be carefully blocked. The rectus having been split and deflected, the edges of the wound are carefully retracted. This is preferably done by the gloved hand of the assistant. We make an effort to use metal retractors as little as possible, for we are often unconscious of the amount of force exerted by them against the wound edges, and hence unwittingly produce undue trauma.

Next, the peritoneum is carefully infiltrated with a small needle, as follows: A small wheal is produced in the peritoneum, and after a sufficient length of time, 5 to 10 minutes, a small nick is made. Now one finger of the left hand is gently introduced into the peritoneal cavity, and with the finger acting as a guide, multiple wheals are produced in the line of incision, each subsequent puncture being made through the edge of a previous wheal, until the entire incision is completely infiltrated. If this is properly done, the peritoneal cavity can be opened without discomfort to the patient. If the abdominal wall has been properly and completely anesthetized, abdominal reflexes should be entirely suspended, and as a result, when the peritoneum is opened there should be a tendency for the viscera to retract (fall away from the parietal peritoneum). The opposite state of affairs is so often seen in abdomens opened under local anesthesia if the reflexes are not completely blocked, then the viscera have a tendency to protrude into the wound, since proper anesthesia has not been attained. As we have shown repeatedly, the discomfort often experienced is the result of traction, and not from trauma of knife or scissors. This is equally true in dealing with the mesentery or omentum.

After the abdominal cavity is opened, the margin of the peritoneum is very carefully raised on the gloved hand of the assistant, and with the use of a long angular needle the edge of the peritoneum is blocked with quinine and urea. This is preferably done by infiltration of 1 cc. of solution at one-inch intervals one inch distant from the wound edge. Personally we have not noted any disturbance of union following infiltration of quinine and urea, but such instances have been reported, hence we take precautions against them. In a large percentage of cases we have noted no pain experienced from the division or even in tying of the meso-appendix, when care is taken not to produce traction. However, when necessary, these tissues can be infiltrated In cases of fibrous adhesions no infiltration is demanded, as the division of these causes no pain. The slightest traction of the mesentery invariably causes colicky pains, and if persisted in will cause nausea and the patient may vomit. In the event a gastroenterostomy is being performed, a free incision is demanded which will permit of clear exposure without traction. Infiltration in the gastro-colic ligament alone will be necessary. There is little or no discomfort caused by clamping or sewing the stomach or jejunum. This was likewise true in the case of ileo-sigmoidostomy. In the cases of gastro-enterostomy there was no disposition to vomit, and the patient complained of no pain and no discomfort. In the cases of cholesystectomy, a free incision is especially demanded. There is no pain caused by incision in liver tissue, but any undue traction in an effort to rotate the liver in an exposure of the gallbladder or ducts will cause pain and a forceful retraction of abdominal muscles, and may preclude the possibility of carrying out the technic. In the event of dense adhesions, the Judd technic might not be possible, owing to the necessity of undue traction in order to expose the ducts. If the Judd operation is to be attempted, the free portion of the gastro-hepatic ligament must first be carefully infiltrated, and the cystic duct and artery exposed and identified. This is the only painful part of gall bladder enucleation, and this having been successfully accomplished, the gall bladder may be removed without discomfort.

In surgery of the ducts, there is nothing that will offer so much comfort to the operator as a head light which will aid in attaining clear exposure, without traction upon the mesentery attachments. It is my custom routinely to wear a head light, which enables one to execute certain mechanics without traction on the mesentery, which is a decided comfort to the operator as well as to the patient.

In the case of hysterectomy, there was some discomfort due to traction. There was no discomfort produced by clamping or cutting down the broad ligaments, they having been infiltrated. A different technic, namely clamping and removing of the uterus before any ligation is attempted would give more room for manipulation without traction, and with these precautions I feel sure that the operation could be accomplished without discomfort. As shown by recent writers, Cesarian section can be accomplished without discomfort, and this is unquestionably an added field for local anesthesia. As shown by Allen, Braun and Shields, the serous and mucous coats of the uterus are insensitive to pain. This is likewise true of the tubes and ovaries, provided no traction is made.

We have experienced little or no trouble in closures in conditions of the lower abdomen, but in cases of incision of the upper abdomen there is often some difficulty although with patience and careful manipulation we have been able to accomplish a closure in every case.

The post-operative discomfort following local anesthesia, compared with that following general anesthesia, is practically nil. The patient reacts from morphine and scopolamin in from four to six hours, with little or no recollection of the operation. It is rather difficult, in most cases, for them to realize for a time that an operation has been done. In a number of cases the patient has slept soundly throughout; except in the stomach cases, they have generally begun soft diet as soon as they reacted from the hypnotic. None has had post-operative vomiting. In a number of cases there have occurred voluntary movements of the bowels before any eliminative treatment was instituted, and in no case has the usual troublesome tympanites been noted, showing that peristalsis had been little or not at all impaired; that is, only temporarily as the result of the morphine, which acting immediately following operation proves an added comfort.

One of the most marked and gratifying things to be noted following local anesthesia is the lack of depression. Most of the cases are bright the following day, and on the second day manifest the usual interest in things, which is certainly not the case following general anesthesia.

While local anesthesia unquestionably has its greatest field of usefulness in the run-down, debilitated type, and in the senile, it can unquestionably be undertaken with safety in much broader fields. With a clearer conception of the proper technic for local anesthesia, by one of the various methods now offered it must and will demand more and more the attention of the painstaking, thoughtful men in surgery.

Local anesthesia in abdominal surgery unquestionably has its greatest field of usefulness in the sub-acute and chronic conditions. In recent months, however, I have experienced no hesitancy in recommending the method in well-defined acute conditions, or in simple drainage. I would hesitate to advise local anesthesia in obscure inflammatory masses in which event some form of anoci-association anesthesia, preferably local anesthesia with gas-oxygen, is unquestionably the safest and surest. and is the anesthetic of choice.

I wish to emphasize by repetition the essentials to the successful accomplishment of local anesthesia:

1. Time.
2. A trained and well organized operating staff.
3. An accurate knowledge of the anatomical field.
4. Feather edge dissection with the gentlest manipulation of tissue (local anesthesia is applicable only in gentle surgery).
5. Proper understanding of methods of administration and action of local anesthesia.
6. A proper selection, with control of patient.

140 Peachtree St.

Post-operative Pneumonitis.

There is no doubt that ether is the anesthetic most irritating to the mucous membrane of the oropharynx, particularly where there is any acute or chronic inflammation present at the time it is administered, and for this reason it should never be used in a case giving a history, or physical signs of recent or concurrent "cold." Chloroform, gas-oxygen, or local anesthesia, according to their individual indications, should be the anesthetics employed in such cases.—Allen O. Whipple, in *Surgery, Gynecology and Obstetrics.*

ABDOMINAL ADHESIONS.*

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When we speak of peritoneal adhesions, we mean a greater or less degree of attachment of two or more peritoneal surfaces, or denuded surfaces which were normally covered by the peritoneum. At first thought we consider these as undesirable attachments, following some irritation which is either infective or irritative. This is an erroneous conclusion, however, for adhesions in the abdominal cavity are far oftener friendly than impulsive in nature. When we consider adhesions collectively we are in reality dealing with Nature's effort against any process which causes the formation of adhesions—and this exertion which she puts forth, and the adhesions which are formed, invariably are favorable in their behavior or attitude toward the tissues involved. This can certainly be made very clear when we recall some abdominal surgery and also some intra-peritoneal pathological conditions. It is this readiness with which peritoneal surfaces adhere and permanently unite about the suture lines that makes possible the various surgical anatomoses of the gastro-intestinal tract. This same adhesive tendency seals averted peritoneal surfaces of all laparotomy incisions, providing the surgeon is painstaking enough to close them in such manner, as to prevent viscus attachments to that line of incision. All of these adhesions are of a permanent type, and in the preparation of this permanency they follow the general laws of first intention healing. If we did not have peritoneal adhesions very promptly attending the inflammatory reactions which are suddenly set up by all pathological perforations of all of the hollow abdominal viscera, these perforations would invariably prove fatal in a few hours. It is due to this facility of peritoneal surfaces to quickly become attached to each other from any irritation, and, by that reactive process to adequately wall off the infective areas, that the general peritoneal cavity is protected from the diffusion of irritation or infected material, as the case may be. This same adhesive force has also performed its duty when we encounter the localized abdominal and pelvic abscesses. These adhesions, however, which wall off or localize the intruding materials—tend to be absorbed when the infection or irritation has disappeared. For this reason we look upon them as being more or less temporary adhesions.

The hair-splitting clinicians also add to the above two types one which they term "peritoneal agglutinations" and another "prenatal" or "fetal adhesions." We will take up the last two first, for I believe that the sooner we forget them the better. Peritoneal agglutination is the coagulation of the serous secretion deposited on the peritoneal surfaces when they are exposed to air or dry sponges, which coagulations simply paste the surfaces together. There has been no surface injury here, and, when the viscera are returned to the abdominal cavity, in other words to their normal environment, the continued secretion of the serosa is increased and the coherent surfaces will soon be released. This coherence is never of a permanent type and I do not believe we could even term it a primary condition, therefore we should bear this class in mind, only to not allow ourselves to become disturbed should we notice such a condition when closing the abdominal cavity. Prenatal or fetal adhesions have been very lavishly discussed the last few years. When an anatomist discovers in his dissection that during the course of the evolution of the intestines the attachment of the free surfaces varied from the general plan of what he terms normal attachments, over a wider limit than his personal idea of ligitimate anatomical pecularities extends, then he regards it as abnormal. He calls these fetal adhesions, which I think is one of our many misnomers. Some have placed in this type of adhesions the Lane's kink and the Jackson's membrane. This I believe is wrong and, from my meager experience, I am fully convinced, and I am not alone in my contention, that the true Jackson's membrane and the true Lane's kink are not congenital malformations, but real adhesions of a permanent character, originating from some chronic irritation, be it prenatal or post-natal, and persisting and increasing in tenacity and extent, by the continuation of that irritation through which they had their beginning.

Dismissing this, let us now consider the two types of characteristic adhesions. The temporary adhesions whose purpose is the mechanical limitation of infective processes—are the most numerous from the pathological standpoint. Their duration is in direct ratio to the duration of the infection within limitation. If the infective process is of too long duration, the adhesive wall may become a permanent adhesion. In the beginning of an infection, the irritated peritoneal surface throws out an exudate, which exudate itself irritates the peritoneal surface of the adjacent surfaces—these exudates become confluent and weld the peritoneal surfaces together, forming a barrier which holds at bay the intruding infection, thereby preventing the patient from being overwhelmed by the absorption of the toxic products. Through this localization his life is saved if the process is not carelessly allowed to continue until the wall, from the accumulation of the contents within, has been broken through. However, there are instances where Nature has been kind enough to make this wall so strong that the rupture occurred through the abdominal wall or into a hollow viscus; such an occurrence is a deplorable circumstance if it occurs through the ignorance of the attending physicians. In every general peritonitis, the infection has been so intense or in such great quantity that it traveled with enough rapidity to entirely overcome Nature's effort at building up a protection wall. Here also we must not forget the patient's resistance, for, if by some disease other than peritonitis, the individual's strength has been exhausted, he is not able to produce an inhibitory wall of adhesions. Especially is this true when that disease is characterized by a marked decrease in the leucocytes. We must remember, too, that the type of infection may have considerable influence on the character and extent of the adhesive formation—the gonococcus seems to possess the greatest capacity of all for the excitation of fibrin-forming exudates. The pneumococci and staphylococci also possess this characteristic in a marked degree, while the colon bacilli and streptococci have a distinct inhibiting action to the secreting of an exudate capable of forming an adhesive wall.

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*Read before the Aesculapian Society of the Wabash Valley at Robinson, Ills.

Adhesions due to external violence are usually of a primary type, unless the injury is great enough to rupture a viscus, or devitalize a portion of the wall to the extent that later a perforation results from the death of that portion, in which case adhesions formed are identical with other peritoneal invasions and therefore may be primary or permanent. The most fruitful source of peritoneal adhesions from violence is the manipulation of the abdominal viscera by the surgeon. Many of these injuries cause adhesions of only a temporary type, but far too many of them are severe enough that permanent adhesions result. How very frequently we open an abdomen, following a previous intra-abdominal operation and find the intestines and omentum firmly adherent to the line of incision through the peritoneum. This can practically be eliminated if the edges of the peritoneum are always carefully everted when the peritoneal cavity is closed. When pedicles of excised organs are left uncovered in the abdomen and pelvis, foreign bodies are left in the peritoneal cavity, and stumps of resected omentum, and raw surfaces are unnoticed in pelvic work and therefore left uncovered—how can we expect our abdominal cases to convalesce without the formation of adhesions. Free blood—even clots—lying on uninjured peritoneum seems to be absorbed without the formation of adhesions, but if these clots lie in contact with the injured or raw surfaces, they have a tendency to increase the amount of adhesive formation at that location. Of course, we cannot say just the degree of injury required to the peritoneum to excite the formation of adhesions, but we do know that if the endothelial layer is destroyed the peritoneal surfaces are sure to adhere at those locations. This does not mean, however, the anatomical destruction of the endothelium in toto, but refers to an injury which only suffices to destroy the physiological equilibrium, and is a trauma which is far less than the actual abrading or rubbing off of the endothelial surface. The surface of the omentum seems to be the most delicate area of the peritoneal surface, therefore it should be handled with great care and gentleness. We must not overlook, however, the few individuals who have an excessive predisposition or what we might term an idiosyncracy to the production of adhesions. In these patients the simple opening of the abdomen for some very slight operation with no packing off of the viscera, and with practically no handling of the peritoneal surface, many of adhesions will be formed, and these are usually of a permanent type. If we know we are dealing with this type of patient we must stay out of the abdomen except when it is absolutely necessary to the life of the patient, because the breaking up of adhesions in these patients means the formation of more.

The processes incident to the formation of permanent adhesions are identical with those of the peritoneal wound healing, therefore, if adhesions are permanent there must be sufficient irritation to produce a fibrin-forming exudate, which irritation must remain over a greater or less length of time. Such processes set up by chemical irritation, which, since antiseptic has been succeeded by aseptic surgery, may be forgotten as a factor in abdominal adhesions. However, we must not forget the iodine on the skin in our present day laparotomies and allow the abdominal organs and that skin to come in contact. We should, therefore, have only two factors producing permanent adhesions; viz., diseased processes of various types and mechanical violence due to the operative procedures, accidents and clumsy or misdirected abdominal manipulation of the surgeon.

During the extension of the diseased processes involving the peritoneum, two exudates are thrown out, a granulating exudate and a fibrinating exudate. Take a perforation of the gastro-intestinal tract as an example: if the extension is not too rapid and the infection not too virulent, a granulating exudate is formed around the site of peritoneal invasion to hold the offender in check while the fibrinating exudate is forming a line of support farther back. This fibrin exudate forms a permanent adhesive wall which cannot be formed in the presence of an acute irritation, while the granulating exudate forms temporary adhesions until the permanent adhesive wall is completed, then later it gradually disappears. If the irritative process is exceedingly slow-resulting in an irritation rather than a direct infection—then a fibrinating exudate is thrown out immediately at the focus of the irritation and a patch of fibrous adhesive tissue blocks the invading irritation at once.

The symptoms of abdominal adhesions are always the same whether post-operative or sequelae of pathological conditions—they are always mechanical and depend on the viscus involved. In intestinal obstruction we find persistent vomiting, inability to evacuate the bowels in spite of all attempts, severe cramps, recurring at frequent and rather regular intervals, rise of pulse rate, absence of fever—and later fecal vomiting. However, do not delay diagnosis for this last symptom for when the fecal vomiting begins and the patient shows a rise of temperature, due to a beginning peritonitis, the diagnosis has been delayed too long, and most likely the condition will prove fatal even if operated upon.

The symptoms of Jackson's membrane are those of a chronic appendicitis—a constipated bowel with the tenderness extending over McBurney's point. The Lane's kink also has the same picture with attacks now and then of colic due to a partial obstruction, but the tenderness is more localized. Adhesions around the gall-bladder may interfere with the drainage of that organ and might not be differentiated from gall stone colic. In these cases we find the gall-bladder adherent to the colon, mesentery and duodenum, it should be removed and the colon fastened high to prevent the re-attachment of the pylorus and duodenum to the denuded area. From a perigastritis due to an inflammatory condition of the liver, pancreas or ulcer of the pylorus or duodenum, we may have any type of distortion of the stomach. These can best be diagnosed with the barium meal and *x*-ray. Pelvic adhesions arising from chronic salpingitis are always troublesome because of the distortion of those organs. They cause backache, pain, varicosities of the broad ligament veins, menstrual disturbances, inability to stand for any length of time or walk any distance or receive jolts, and one finds on bimanual examination, tenderness of these organs, with pelvic masses and moveable or displaced organs.

The surest way to diagnose adhesions of the abdominal viscera to the abdominal wall is through the pneumo-peritoneum which has been so well worked out and perfected by Dr. B. H. Orndorff of Chicago. By inflating the abdominal cavity with oxygen—raising up the abdominal wall from the viscera—taking *x*-ray pictures laterally—we can show the adhesions and any attachment of the organs to the anterior wall very vividly. The trocoscope is also a wonderful aid in discovering adhesions of the colon.

Though the purpose of adhesions is repair of the solution of continuity of the peritoneal surface, as depended upon in all abdominal surgery, misdirected activity of this process may cause trouble. This reputation for mischief has been greatly exaggerated by the shyster surgeon. Through these charlatans, the horror of adhesions has been so impressed on the lay mind that it has brought all adhesions into ill-repute. Before adhesions give any symptoms there must be a disturbance of the functions of a hollow viscus, therefore pain, which is the usual symptom, is produced by their mechanical fixation. Before Jackson's membrane and Lane's kink and, I must also say, some bunglesome inexperienced abdominal work made their entrance into the surgical world, symptoms due to adhesions were a surgical rarity. When an adhesion causes pain it must limit the mobility of a hollow movable organ. Pain produced by adventitious bands is unusual unless the function is disturbed. If we would consider seriously the liability of a pre-operative faulty diagnosis, when operative procedures have failed to relieve, rather than the excuse of post-operative adhesions, a vast proportion of re-operations would be avoided. Narrow bands, which are the aftermath of adhesions are most frequently the cause of the trouble. They slowly obstruct or angulate an organ or form a sling over which the organ may fall, causing an acute angle of its lumen, therefore an acute obstruction. A loop of intestine attached to an acute inflamed area may give a partial obstruction for awhile, Nature releasing the hold at the termination of the inflammation. However, when many weeks are required for the inflammatory process to be taken care of by Nature, the fibrous tissue forming the attachment may become permanent, which process then assumes the character of scar tissue. Continued irritation therefore may cause the continuation of the adhesions, but after the removal of the causes, they tend to disappear and at times disappear completely. It is quite puzzling why there is so much variation in this disappearance. There is nothing more impressive than to drain an intra-peritoneal abscess and in a few months re-open this same abdomen and find no adhesions whatever, or perhaps only one small band remaining, causing an obstruction. Permanent adhesions behave like scar tissue. If they are occasionally exposed to irritation they have a tendency to contract, but if there is continual pull on them the tendency is to stretch. But, the omental adhesions and also those of the peritoneum which are attached to an abdominal peritoneal incision, seem to have little tendency to disappear or to lessen with time.

The most important treatment of adhesions is their prevention. After they have formed, when placed by Nature for protection, with their tendency to disappear with the ceasing of the irritation, they must not be molested unnecessarily by operation and especially is this true when dealing with abscesses as Nature has already walled off the peritoneal cavity, and, if broken through we are only undoing what Nature has rightfully done. Our antipathy should be directed not against the adhesions, but against the factors producing them, be these factors infection or injuries, either external or from our own misguided efforts. When they limit the movement of a mobile organ or contract its lumen, the Chiropractor says "adhesions" and for this he adjusts the spine; the Osteopath attempts to eradicate them by massage; the general practitioner tries to absorb by drugs and the fibrolysin which once was heralded with a loud noise, but which has furnished no evidence of favorable results. When an adhesion exerts a pernicious influence there is but one thing to do and that is operative. The offending band must be severed and means instituted to prevent its recurrence. The ideal way of dealing with adhesions is to divide and cover over the raw surfaces to prevent the reformation, but this is often impossible. We sometimes wonder if it is worth while to separate adhesions when their extent is so great we are sure we cannot cover over this surface, but when they are exerting an influence detrimental to life, we must say "yes." If they were formed from infection they may not recur, after being broken up, if the infective agent has disappeared. Some may form but they may not be so dense as before and may not cause any trouble with the function of the organs, and, if so, they will be symptomless. If the reformation of the adhesions does not angulate or constrict the lumen, the patient will be better off for having them released. We always have the omentum at our service and small pieces of it may be resected and placed over the denuded areas. When the denuded areas are in the pelvis and we are unable to cover them over with peritoneum, the omentum may be used as an apron of protection.

In our operative work we must reduce trauma and handling of peritoneal surfaces to a minimum. Long exposures in abdominal work must be shortened; we must use moist packs and no antiseptics within the abdomen. The iodine-sterilized skin must not come in contact with the peritoneal surface. Every denuded surface that can possibly be covered over by the peritoneum must be taken care of in that way. There has been much study and speculation and a vast number of experiments made without thought of the fundamental principles of adhesion formation.

If we discover on opening an abdomen, adhesions between the anterior peritoneal wall and the peritoneal surface on any of the abdominal organs, and, after closing the abdominal wound, use the pneumo peritoneal method of keeping the peritoneal wall held up from the viscera, I think we will prevent the reformation of those disagreeable sequelae.

La Plante Bldg.

Tuberculosis of the Larynx.

It is conceded by almost all observers of the present day that tuberculosis of the larynx is secondary to phthisis or tuberculosis of the lung, and while a small proportion of cases appear to occur primarily in the larynx, the early symptoms of pulmonary involvement and the extensive amount of lung tissue affected as shown by the x-ray findings has dissipated any notion that the affection is ever a beginning laryngeal condition.

The mucous membrane of the upper respiratory tract is very vulnerable against the invasion of the tubercle bacilli in contradistinction to the lung tissue, which offers a fertile field for the growth and development of these germs. The evidence thus far is overwhelming in considering the lymphatics and blood vessels responsible for the carrying of the bacilli to the larynx from the lung and setting up the process here as a secondary affection.—Hugo Kunz in *The Laryngoscope*.

A NEW OPERATION FOR COMPLETE TEARS OF THE PERINEUM.

DR. LÉON IMBERT.

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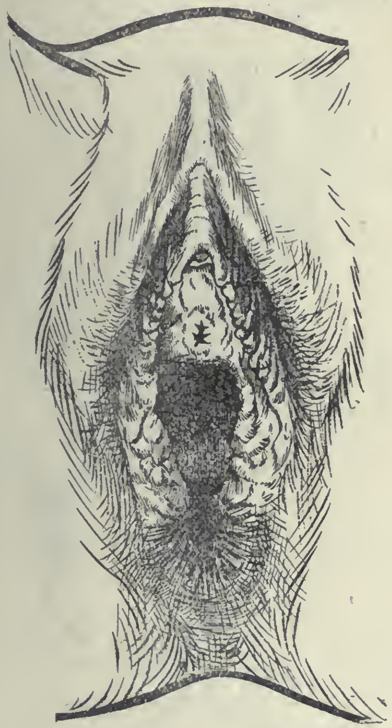
Professeur à l'École de Médecine; Correspondant de l'Academie de Médecine.

Complete tears of the perineum are often difficult to cure because of imperfect union of the operative wound, which results in a recurrence. For some time I have been employing a procedure which seems to me to avoid, almost surely, these surgical difficulties and which provides a thick and solid perineal covering.

A

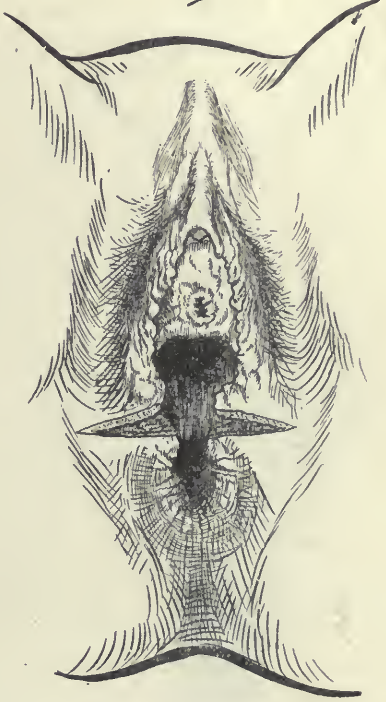


The figure marked "A" simply illustrates the familiar appearance of a complete perineal tear with a cleft forming communication between the vulva and anus.

Figure 1 shows the first step of my operation: A transverse incision extending about two centimeters on each side of the median line, and separating the vulva from the anus. At the bottom, this incision should, if necessary, detach the vaginal from the rectal mucous membrane. This step of the operation is shown in figure 2, which illustrates the vaginal mucosa lifted up by a short flap.

In figure 3 this flap of mucous membrane has been largely dissected up. It is detached on each side from the borders of the labia majora and finally resected by an incision separating it from the rest of the mucous membrane. This step completed, one now sutures the tissues in the manner indicated in figure 4: The vaginal gap is closed

1



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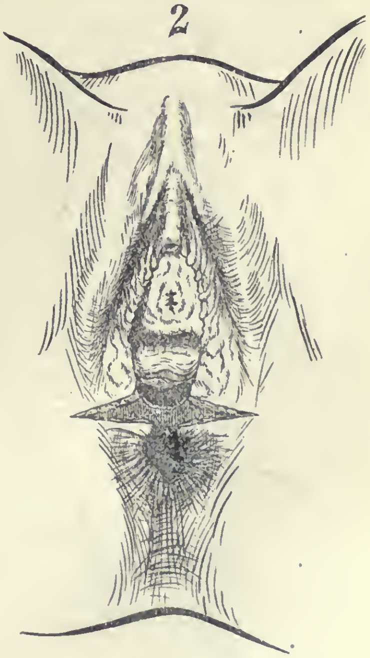
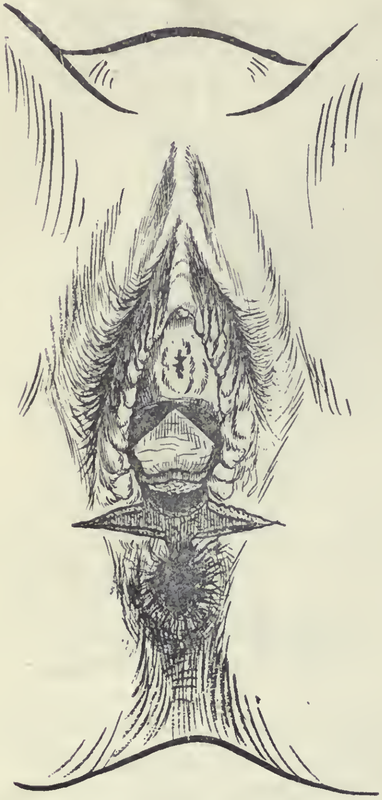


edge to edge; similarly the anal gap, and, if necessary, the rectal mucous membrane. At this step the vagina and rectum are sutured and isolated from each other, but there remains the gap in the center, the closure of which is essential. If the points of suture yield here, a recurrence follows. At this step, I cut on either the right or the left side, a flap as shown in figure 4. The direction of this flap is vertical as the patient lies on the table, and the incision making the inner edge of the flap is continuous with the original transverse incision. The region here is quite fatty and I do not fear to make a very thick flap, for the breech to be filled is both wide on the surface and deep. It is therefore important that the subcutaneous fat of the flap should be pushed into the angle between the vagina and rectum. This done, I suture the flap as shown in figure 5. The skin of this region is abundant and soft and there is, therefore, no difficulty in closing the defect made by cutting the flap, by simple suturing.

3



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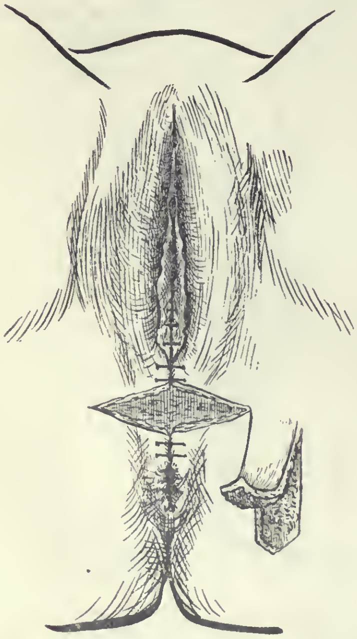

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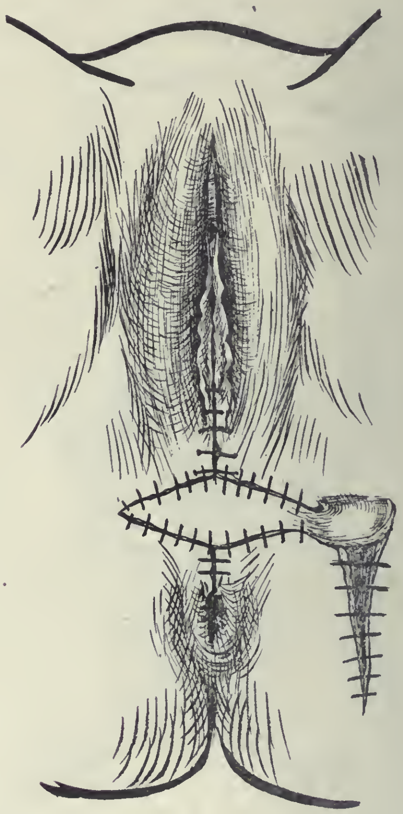

This operation has given me excellent results, even in complicated cases.

Colostomy.

No type of colostomy yet devised can obviate the need of bowel training and diet restriction to control the escape of feces.

THE COMPARATIVE VALUE OF CLINICAL HISTORIES, PHYSICAL FINDINGS AND ROUTINE WASSERMANN TESTS IN THE DIAGNOSIS OF OBSCURE SYPHILIS. REPORT OF CASES*

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In the diagnosis of any disease we rely chiefly upon three essential factors, namely the clinical history (which includes the venereal history) the physical findings and the various laboratory tests. The same is true in the diagnosis of obscure syphilis, and it is interesting to make a comparison in the values of each of these three factors.

It is a clinical fact that syphilis must always be considered in the diagnosis of any chronic disease, as well as in a certain number of acute diseases. The point is, how is it to be considered? Are we going to rely entirely on the clinical history? Are we going to rely on the physical findings, or are we going to take a Wassermann test and if negative, let it go at that? All three are very necessary. It is the importance of each of these that I desire to bring forth in this paper. I wish to call attention to the cases tabulated, in order that the discussion of each of these factors may be more clearly understood. (See table.)

First of all, the clinical history is of great importance as an introduction to the study of a case. It gives not only a clue to the nature of the disease, but also a basis for the diagnosis in a large percentage of cases. Cases B, F, H, and L might well have been mistaken for some other condition, had the clinical histories been depended upon to a too great extent. On the other hand, cases A, G, I, and J suggest syphilis in their clinical histories. Case A is interesting inasmuch as the clinical history is an unusual one for tabes dorsalis. It is atypical in that the rope sensation was felt in the lower part of the chest instead of around the waist. In connection with the clinical history, the venereal history must be considered. However, its value is questionable. Cases B, C, D, G and K illustrate the fact that a negative venereal history means nothing. Some of these patients give a history of having had only gonorrhea. Others stated that they had a very slight venereal sore which "didn't amount to much" and disappeared in two or three days, yet it seems to be the only possible primary lesion they could have had. As to those that give only a history of gonorrhea, and who later turn out to be syphilitics, it might be said that there must be some relation between gonorrhea and intra-urethral chancres. If this were a rare coincidence we could easily consider it an error in the history, but because of the fact that it is of common occurrence, we must always consider the possibility of the presence of syphilis whenever such a history is given. Furthermore, those cases which give a history of any primary lesion on the penis or vulva, or elsewhere, and especially if followed by the symptoms of the secondary stage, are to be very carefully considered for lues, in spite of any previous treatment which they may have taken.

Secondly, the physical findings are of major importance in the diagnosis of obscure syphilis. Beginning with the head, we often notice areas of alopecia which suggest lues. The eyes very often show a slight external strabismus. Ptosis of the upper lid seems to be a very prominent symptom in a large majority of cases. The reaction of the pupils to light is of considerable importance also, as well as any inequality of them. Routine Romberg tests have also proven to be very valuable. The angle of the mouth will often show a fan-shaped thickening in the mucous membrane. The throat also may show some signs such as leukoplakia, cicatrices of previous mucous patches, or other specific signs. In the chest, if a heart lesion is found, the taking of blood pressure on both sides may show a variation of 20 mm. Hg. or more. This sign at once points towards aortic aneurism, a condition which in the majority of cases is due to syphilis. The pulses in the two wrists may vary in volume. This sign also demands a thoracic *x*-ray examination for aneurism. The abdominal examination rarely reveals any valuable sign unless it be enlargement of the liver, a condition which is very often due to a specific lesion. The patellar reflexes, if at all diminished or absent, demand very careful study for lues. The skin also should always be examined closely for syphilitic lesions. Cases B, E, F, G, I, J, K and L all show one or more of these physical signs.

Thirdly, the value of routine Wassermann tests is unquestionable. There is always a certain number of cases that have a negative luetic history, negative venereal history, and negative physical findings, and yet the Wassermann reaction is strongly positive. Case C illustrates its value. A man who had an impacted fracture of the os calcis, and who had a negative history and no physical sign of lues, had a strongly positive Wassermann reaction. Case D is another good illustration. A woman, pregnant, entered the clinic for the purpose of a thorough physical examination. There was no history, no physical sign of syphilis, yet the Wassermann reaction was four plus. Later, upon questioning the husband, he admitted having had a chancre about two years before which was followed by the rash of the secondary stage. His Wassermann reaction was

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*Read at the Summer Meeting of the Sanilac County Medical Society at Croswell, Michigan, July 6, 1920.

Case	*Sex*	*Age*	*Complaint*	*Brief Summary of Clinical History*	*Venereal History*
A-1106	M	46	Pain in stomach and abdomen. Cramps in legs. Rope sensation around lower part of chest.	Stomach trouble for 2 yrs. Attacks of pain in stom., vomited, "saw stars," 6 such attacks. Distress in stom. p. c. (½ to 1 h. p. c.) varies in duration. Periodicity—goes 2 or 3 wks. feeling fine. Walking makes distress worse. No history of jaundice. No hypo required with attacks. Cramps in legs are now more of a constant ache. Tight sensation around lower part of chest for about 1 yr. Has pulling down sensation between shoulders when walking. Referred pain to rt. shoulder at times. Last summer lost in wgt. from 148 to 115.	Gonorrhea 15 yrs. ago. Denies any primary lesion.
B-1213	F	52	Goiter: nervousness.	Has noticed gradual enlargement of thyroid for 20 yrs. No other symptoms of exophthalmic goiter, except palpitation at times. 25 yrs. ago had an attack of "gall sones." Has sharp pains at times now in right abdomen. Hypo required with attack 25 yrs. ago. No history of jaundice.	Negative.
C-742	M	33	Fractured ankle.	Five wks. ago fell 10 ft., landing full wgt. on rt. heel. Went without any medical attention. Swelling and ecchymosis followed accident. Hasn't been able to walk on it since. Pains now only when pressure applied.	Negative.
D-767	F	24	Pregnancy. Wanted a thorough examination.	Essentially negative, except that two month ago she had morning sickness and vomiting.	Negative.
E-798	M	37	Pain in rt. abdomen, radiating to left side. Burning sensation in rt. back.	Began 5 yrs. ago with soreness across abdomen. Pain is less or absent p. c. Worse when riding, or being jarred. At work (R. R. engineer), he is jarred considerably which makes pain worse. No history of jaundice. Has referred pain at time to either rt. or left shoulder. Rarely vomits. No medicines have helped. His wife has had one miscarriage.	Gonorrhea 19 yrs. ago.
F-430	M	37	Pain in stomach when walking.	Had present trouble for 6 wks. Pain has no relation to eating. It is worse when walking. Does not pain when standing still or sitting down. No nausea nor vomiting. No diarrhea. Bowels regular up to 2 mos. ago. Now somewhat constipated. Married 9 yrs. No pregnancies.	Gonorrhea 17 yrs. ago. Also had a sore on penis 17 yrs. ago which disappeard in a few days by taking internal medicine.
G-246	F	38	Neuralgia of right side.	She has always been nervous, but worse for past 10 yrs. Three yrs. ago she had a "nervous breakdown." Pain is only on right side, principally right side neck, up towards temple, right upper jaw, arm, both shoulders and right thigh. She had 2 previously induced miscarriages. No childbirths.	Negative.
H-1172	M	33	Pain lower rt. quadrant. Gas in intestines. Losing weight weakness.	Began 3 yrs. ago with pains in abdomen. Felt like gas gurgling. Pains always worse on right. Was operated upon elsewhere 1 yr. ago at time of an acute attack, when he was old there were ulcers of the bowels. Appendectomy was done. At the present time if he uses cathartics freely there is less pain.	Gonorrhea and a pimple on the penis 15 yrs. ago.
I-1178	M	57	Pain from hip to toes (right side).	Has had "rheumatic" pain either in one leg or the other off and on for 10 yrs. Present pain which is of cutting and shooting character, in right hip and leg for past 4 mos. He has had no rope sensation about the waist, and no gastric symptoms.	Seven yrs. ago had a sore on penis which lasted 3 days. Gonorrhea 10, 8 and 3 yrs. ago.
J-642	M	45	Pain in chest with an occasional shortness of breath.	While loading hay in a field one day this past summer he had to stop work because of a pain in the chest. It lasted but a short time. The pain has been present more or less since. It gave him more trouble in damp weather.	Gonorrhea 27 yrs. ago. 25 yrs. ago had a "soft chancre" which lasted but 4 days.
K-1080	M	69	Dizziness. Pains, cramps and numbness in legs.	Began with dizziness 5 yrs. ago, which was soon followed with cramps in legs. They have always been worse at night. Whole body felt numb at times. Has been getting weaker lately. Has black spots before eyes at times.	Negative.
L-761	M	64	Sore on left wrist. Loss of weight; weakness.	35 yrs. ago fell, fractured left wrist. It became anklyosed 4 yrs. ago—motion had previously been impaired and gave considerable pain. One year ago a sore appeared on dorsum of wrist which has never healed. Has since been losing strength and lost 20 lbs. in wgt.	Gonorrhea twice 45 and 46 yrs. ago. 40 yrs. ago had five sores on penis which lasted for 6 mos. Followed by a general rash. History of taking liquid medicine internally at that time.

positive also. Both he and his wife took rigid antisyphilitic treatment. Case H is interesting from the standpoint of both the history and the Wassermann test. A man, aged 33, complained of pain in the lower right abdominal quadrant, gas in the intestines, loss of weight and weakness. His illness

Summary of Abnormal Physical Findings Including Fluoroscopy and X-Ray	*Wassermann Reaction*	*Provocative Wassermann or Therapeutic Test*	*Diagnosis*
Tonsils moderate in size—chronic tonsillitis. Left submaxillary nodes enlarged. Moderate tenderness in epigastrium and over gall-bladder. X-ray and fluoroscopy of stomach and duodenum negative.	++++	Not required.	Chronic tonsillitis. Chronic cholecystitis. Gastric crisis of tabes dorsalis.
Slight ptosis left upper lid could be detected. Sluggish reaction of pupils to light. Romberg neg. Pyorrhea, one alveolar abscess. Fibroid uterus, and two small fibroids on cervix. 2 small white spots on either side pharynx. Multiple cystic adenomata of thyroid.	++++	Not required.	Multiple cystic adenomata thyroid. Cholecystitis with probability of stones, fibroid uterus, focal infection and syphilis.
Severe degree of pyorrhea. Submaxillary nodes enlarged. Noticeable enlargment of thyroid. Heart: Tachycardia and a slight systolic murmur heard only to right of apex. X-ray showed impacted fracture of os calcis (right).	++++	Not required.	Focal infection. Heart lesion. Impacted fracture of right os calcis. Syphilis.
Teeth. Slight infection about the lower third molars. Tonsils large, and showed chronic tonsillitis. Submaxillary nodes enlarged. Breasts: Enlargement of Montgomery's glands. Heart: Slight systolic murmur three inches left of midline in 4th interspace. Abd: Enlargement of pregnancy. Cervix: Hegar's sign positive.	++++	General condition improved after treatment. The husband later admitted that he had had syphilis and that his wife had contracted it.	Chr. tonsillitis. Pregnancy. Syphilis. Note:—Child born and thus far has showed no physical signs of lues.
A moderate degree of pyorrhea—2 alveolar abscesses. Submaxillary nodes enlarged. Angles of mouth showed a fan-shaped thickening in the mucous membrane. Slight syst. murmur at apex. Some tenderness over gall-bladder and appendix upon deep palpation. Rt. inguinal ring weak. X-ray diagnosis: Lues gastricae (antrum).	Negative. [illegible]	Negative. Improved under treatment for lues.	Chr. cholecystitis. Chr. appendicitis. Gastric lues.
Mild degree of seborrheic dermatitis. Pupils unequal. Left larger than right. Sluggish reaction to light. External strabismus. Severe pyorrhea, and two abscessed teeth. Chr. pharyngitis. Abd: Slight tenderness in umbilical region. Patellar reflexes exaggerated, especially on left side. X-ray diagnosis: Lues gastricae.	Negative.	+++ Complete recovery.	Gastric lues. Focal infection.
Right central incisor suggestive of a Hutchinson tooth. The patient said she broke it on a doll when a child. Tenderness over rt. shoulder. Throat was only suspicious of lues.	++++	Remarkable improvement.	Syphilis and Focal Infection.
Moderate degree of pyorrhea, one alveolar abscess. Chr. tonsillitis—large tonsils. Pulse rate 104. A few rales at base of rt. lung—negative. Abdomen: Slight tenderness over McBurney's point. Slight tenderness high in rectum. Stomach fluoroscopy and x-ray negative. Colon ray showed a constriction in transverse colon due to adhesion.	++++	Improving under treatment.	Focal Infection and Syphilis.
1 infected root, 1 alveolar abscess. Moderate myocarditis. Old cicatrix on dorsum of penis. Rt. inguinal hernia. Chronic comedosis of skin. Charcots joint rt. knee.	++++	Pains disappearing after removal of foci and treatment with arsphenamine.	Focal Infection and Syphilis.
Severe pyorrhea, and a loose bridge which harbored a very disagreeable odor. Chr. tonsillitis. Submaxillary nodes enlarged and hard. Heart: Diastolic murmur over 2nd interspace at rt. sternal border. Also heard along vessels of neck. Right pulse greater in volume and of pistol-shot type. Blood pressure — Systolic — Diastolic Rt. side — 142 — 110 Left side — 108 — 70 Abdomen: Mild degree of ascites. Varicosed veins both lower extremities. Moderately enlarged, hard prostate. X-ray of chest showed aneurism of the transverse aortic arch.	++++	Satisfactory recovery after treatment.	Ancurism of Transverse Arch of Aorta due to syphilis. Focal Infection.
Slight ptosis of left upper lid. Left patellar reflex diminished. Prostate enlarged and hard (no symptoms). Dilated vessels on skin of face.	Negative.	Negative. Disappearance of symptoms after treatment.	Syphilis.
Pupils: A sluggish reaction. Romberg's sign faintly suggestive. Liver enlarged moderately. 2 cicatrices on posterior surface of scrotum. Ankylosis of left wrist. Luetic ulcer on dorsum of left wrist. Scar of old ulcer on middle one-third of right leg. Varicosed internal sephenous vein rt. leg. X-ray of wrist showed definite bony ankylosis.	Negative.	Negative. Ulcer healed following treatment. Small sinus still persists.	Syphilis. Ankylosis of left radio-carpal joint.

began three years before with pains in the abdomen. He was operated upon elsewhere one year ago at which time he was told there were ulcers of the bowels. The appendix was removed. This man had gonorrhea and a pimple on the penis fifteen years before. There was no physical sign of syphilis except that fluoroscopy of the colon showed a constriction in the transverse colon due to an adhesion. But a Wassermann test, which is taken as a routine procedure, was found to be positive four plus. The question arising in this case is, was it a surgical case one year ago or was it purely an overlooked case of syphilis? Case B is especially interesting as regards both physical findings and the Wassermann reaction. This woman came to the clinic for the removal of a goiter. The result of rigid examination showed that she was suffering not only from multiple cystic adenomata of the thyroid but also from chronic cholecystitis, a fibroid uterus, foci of infection in the teeth, and syphilis.

Conclusion. In comparing the values of the clinical histories, the physical findings and routine Wassermann tests, it may be said that all are necessary in the diagnosis of obscure cases of syphilis. The fact that syphilis may mimic all other diseases, is sufficient to warrant the most careful consideration of all cases. By giving more attention to all of those three factors, there will be more cases of obscure syphilis diagnosed correctly.

UNUSUAL CASES OF MASTOIDITIS.

Harold Hays, M.D., F.A C.S.,
New York City.

The cases of mastoiditis that occurred during the past winter in New York City, particularly since January 1st, reached alarming numbers. Moreover, there were unusual complications of so severe a nature, that I feel warranted in describing some of them.

In former years, we were of the opinion that ninety per cent of cases of acute catarrhal and acute suppurative otitis media, where it was necessary to incise the drum, got well within the course of a very few days or a week, and that only a small percentage of these cases actually developed mastoiditis. We would like to feel that such a thing always occurred, but, this year, things have taken such a turn that instead of ninety per cent of the cases of acute suppuration subsiding, the figures have been revesed, and the majority of cases of acute otitis media developed mastoiditis. After one or two months of an experience such as this, I almost felt that, every time I was called in to see a case of otitis media, sooner or later I was going to be called upon to operate for mastoiditis.

Most of these cases developed acute suppuration of the middle ear without any previous warning. Some of them occurred after influenza, but the majority of them occurred where there was nothing to make one think that there was going to be any real trouble. In the majority of these cases, the drums were incised as soon as any bulging occurred, and it was my invariable practice to have a culture made from the discharge from the incision, as soon as possible. These cultures showed a variety of organisms. In the majority of cases, particularly those that developed complications, the organism was the streptocuccus hemolyticus. The blood counts of these cases ranged from 14,000 to 25,000 white blood cells, with a polynuclear count from 75 to 90 per cent. The fever was usually high, but this was not so in some of the cases where, although the temperature might have been high at the onset of the trouble, after the drums were incised, it generally went down to normal, and remained there regardless of whether the mastoid was involved or not. In two cases that I recall, the temperature had risen to 106°, and after the drums were incised, gradually went down to normal and stayed normal. However, the symptoms of mastoiditis progressed until it was imperative to operate, and in both instances a total destruction of the mastoid cells was found. I shall cite a few of the most interesting cases.

Case I. This was a child of two and one-half years, who had an acute otitis media in both ears, starting about January 3, 1920. There was a streptococcus hemolyticus infection in both ears. The drums were widely opened, and allowed to drain for a week or ten days, when on account of the scantiness of the discharge, and on account of the increase in fever up to 102.5°, it was found necessary to incise both drums again. At the end of three weeks, acute tenderness could be elicited on the right side, and that same night, the right mastoid was opened and the cells completely exenterated. The operation was a very simple one, no dura was exposed, and the sinus plate was hard and intact. The day following the operation, the temperature rose to 104°, and this fever continued irregularly for three days, when it was decided that it was necessary to operate the left mastoid. When the incision in the periosteum was made, it could be seen that a small area of the bone was superficially necrosed, and that a sub-periosteal abscess would, no doubt, have developed within twenty-four hours. The mastoid cells were in a similar condition to those on the opposite side, and the entire mastoid was exenterated. The day following the operation the temperature still continued high, and this temperature, with slight remissions, continued for about five days up to 105.5°, when suddenly it dropped to normal. We naturally thought we were out of the woods, but the following day the temperature again rose to 105.5°. The two blood cultures that were taken were negative. The blood count was 25,000 with 85% of polynuclear cells. The second examination of the blood and urine, and examination for signs of meningitis were negative. I could not convince myself, however, that there was anything in the mastoid wounds to cause the continued fever, and after opening both wounds, and seeing that they looked healthy, I determined that it was necessary to find a lesion elsewhere to account for all the trouble. On the seventh day, a small spot of consolidation was found in the right lung, and this increased in size until almost every part of the lung on the right side was involved. The high temperature continued for three weeks with an involvment of one part of the lung, either on the right or left side, as another part resolved. The ear continued to take care of itself nicely, but the child's general condition was so poor that it was decided that a transfusion was necessary. This was done by the Unger method, and at the end of three or four weeks, the temperature came down by crisis, remained down, and the child eventually recovered, without any difficulty or permanent impairment.

Case II. At the same time that the previous case was in the hospital, I operated upon another child about five years of age, who had a marked involvement of the mastoid on the left side. The previous history is of interest. By telephone I was informed that the child had been running a temperature daily up to 102°. He did not feel sick. For the past few days he had been getting noticeably deafer. Examination showed both drums gray in color and markedly bulging. Free pus, under pressure, was found on incision (streptococcus hemolyticus). I prognosticated an eventful mastoiditis. On entering the mastoid a superficial sinus was found with a perisinus abscess, most of the diseased cells lying underneath and behind the sinus. The mastoid was completely exenterated, and, as in the previous case, on the third day it was necessary to operate the other mastoid. The temperature gradually went down to normal, but on the tenth day jumped to 106°. I had been anticipating a sinus involvement. A positive blood culture of a streptococcus hermolyticus showed on the plates immediately taken, after twenty-four hours. The question then arose as to which sinus was involved, and indeed it was a difficult matter to determine.

Drs. Wendell Phillips and Samuel Kopetsky were called in consultation, and at the suggestion of the latter, I had the eye-grounds examined to determine whether there might be an engorgement of the retina or a choked disc. It has been shown that frequently an edema of the papilla or a choked disc is present on the side on which the sinus is involved. This point was exceptionally valuable in this case, for the eye-ground on the right side was found to be normal, while on the left side there was a choked disc. Within a few hours after this fact was determined, we exposed the sinus, which we found to be non-pulsating, uncapped it, and then ligated the jugular vein. The sinus was then opened, and plugged at either end. There was no distinct pus or clot found, but as we were positive that we were dealing with a thrombosis which had been proved by the blood culture and eye examinations (small facts in themselves), we determined on the above procedure and awaited developments. In the course of a few days the temperature gradually went down to 103.5°. Within a short time, an abscess of the foot developed, which had to be incised. Again, here, the child's general condition was so poor that a transfusion was done by the Unger method, and in the course of the next few weeks both wounds behind the ear had healed nicely, the foot condition cleared up, and the child recovered without any further trouble.

I now come to the citation of a few cases which are unusual, in so far that they have not occurred within the experience of many of us, very often. In these cases a complete mastoid operation had been performed, with the exenteration of all the visible cells that were diseased. There was no particular reason, in any of these cases, why the wound should not have healed up completely, although we knew that we were dealing with a streptococcus hemolyticus infection.

Case III. In the first of these cases, a child of nine years, a simple mastoid operation was performed. That same evening there was a profuse discharge of blood from the ear, which made it necessary to redress the wound, and eventually, to take him up to the operating room, feeling that we perhaps were dealing with a large emissary vein which was bleeding. However, the bleeding was found to come from some granulations which still remained in the antrum. The wound was packed, and the bleeding ceased. The following day he complained of severe pain in the right side of the abdomen, and the doctor in charge of the case decided that he had an attack of acute appendicitis. This was indeed a complication which might prove difficult to handle, but by the use of ice-bags, we were able to get the inflammation to subside, and no further trouble took place there. At the end of ten days the boy left the hospital in excellent condition, and I dressed his wound at home a few days longer. The wound looked fairly clean, and we thought we were out of any danger, but within a few days after this it began to discharge very freely, and in spite of anything we could do, the discharge continued to get more profuse, from both the ear canal and the wound itself. Moreover, the child began to complain of excruciating pain over the right eye which simulated a supra-orbital neuralgia. Examination of his eye-grounds at this time was negative, the temperature had remained normal, and his blood count was within the normal limit. After watching him carefully for three weeks, it was decided that it would be best to reopen the wound and see whether more destruction could not be found. This was done in consultation with Dr. Robert Lewis, an on entering the zygomatic cells, it was found that there was an extensive involvement of this region, extending far forward beyond the lobe of the ear, toward the outer canthus of the eye. In removing the cells from this region, a small area of dura was exposed. Besides the involvement here, an osteomyelitis of the temporal bone and the occipital bone beyond the mastoid was found. This bone was thoroughly cleaned out. An area of necrosis found between the semi-circular canals, deep down in the thickest portion of the bone, was thoroughly exenterated. I was fearful of too extensive manipulation and we decided to stop the operation here, packing the wound thoroughly. The following day the child was extremely dizzy and, although the temperature was normal, we were apprehensive because he developed every symptom of acute labyrinthitis. This diagonsis was corroborated by Dr. Isadore Friesner, who was called in consultation. However, in the course of a few days, the temperature subsided, the dizziness disappeared, and on the eighth day the boy went home in excellent condition with a marvelous appetite and having gained seven or eight pounds in weight. For the next few weeks he came into my office regularly, the wound discharging less and less, and at the end of this time it was felt that he was well beyond any danger. Suddenly, at 4 o'clock in the morning he developed a temperature of 104° with severe attacks of vomiting, and at 10 o'clock this same morning, had a severe convulsion of the entire right side of the body. He was again taken to the hospital, where the convulsions were more carefully observed, and it seemed to us that he no doubt had an abscess of the tempero-sphenoidal lobe on the operated side. The following day the wound was reopened, the dura exposed and the brain entered, but it was impossible to find any sign of any abscess anywhere. Through small openings in the dura, a grooved director was inserted into the brain and a search made in every direction as far forward as the frontal bone, as far backward as the tentorium and inward to the lateral sinus. Nowhere could any pus be found. The patient was returned to bed. However, the convulsions did not cease. The child was hardly conscious at any time, and repeated and more severe convulsions occurred. The temperature remained high for four or five days, and the child continued to get worse. A lumbar puncture, performed at this time, showed the fluid clear, and a cell count of about 250 leucocytes to the cubic millimeter. The fluid was not under any pressure, and the blood count was in the neighborhood of 20,000 cells, with 90% of polynuclears. Each time that I did the dressing I probed the wound to find out whether there was any possible portion of it which I had not explored. But each time there was no pus or any evidence of any infection. On the fifth day the child died. Immediately after death I explored the wound again. This time I inserted my finger deeply into the brain, and explored in every direction as far forward, backward and inward as possible.

Case IV. A man of sixty-four who came to consult me one morning complained that he had had an abscess in his ear three or four weeks before, which had not cleared up. A small amount of discharge was seen coming from a small perforation in the lower part of the drum, and I suggested that the ear drum immeditely be reopened. This was done under ethyl-chloride anesthesia, and the case carefully watched for three weeks. At the end of this time there was no more discharge, and it was suggested that we now attempt to bring back the hearing. A few days later, the man again complained of pain and had a slight fever, and in the course of twenty-four hours his temperature jumped to 104° and it was determined that he had an infection of the mastoid which should immediately receive operative attention. This diagnosis was corroborated by an *x*-ray picture, which showed a large and pneumatic mastoid with all the cells distinctly clouded. At eleven o'clock that evening the mastoid was operated upon and the cells found to be destroyed and filled with pus. The discharge was due to a streptococcus hemolyticus infection. The man did very well for eight days, at the end of which time the wound was practically healed, and he left the hospital in excellent condition. He remained this way for three or four days longer, when, coming to my office for dressing, suddenly one morning, he complained of a slight pain in the temporal region, extending forward toward the eye, and when I went to see him later in the day, I found that his temperature had risen to 104°. A blood count then showed 26,000 white blood cells, with 85% of polynuclears. I was still apprehensive of a sinus thrombosis, for a perisinus abscess was found at the time of operation. But of course, we decided to wait, on account of the negative blood culture, and because the temperature went down gradually to normal. He remained in bed for four or five days, during which time the temperature remained normal, and then on getting up on the following day, he again complained of the same severe headache on the right side, and his temperature again arose to 104°. At a consultation held that evening, it was determined that he either had a sinus thrombosis or a small abscess, which was located at the base of the brain. However, even with this consultation concluding as it did, I determined that it was wise to wait until we got the report of another blood culture. The blood count at this time was again 26,000 white blood cells, with 87% of polynuclear cells. The next morning the temperature suddenly went down to normal, and remained normal for the next ten days. The patient, however, still complained of this severe pain, but it seemed to respond very well to aspirin and to other analgesics so we decided to leave him alone, and at the end of another week, the mastoid wound had entirely healed. I decided that we were at the end of our troubles, but unfortunately the temperature rose again at the end of another week, the man complained of a pain in his chest, and a well-developed pleurisy was diagnosed. Even to this day he is not entirely well, although the wound has healed.

Case V. This was a married woman of thirty, who complained of sudden severe pain in the left ear one evening. While I watched the ear drum, I could see the fluid forming behind it, a most unusual thing to see. I immediately sent her home, and a short time after incised the drum. The ear continued to discharge fairly profusely, but at the end of a week it was necessary to make a second incision. She was in an extremely highly nervous state, and was complaining particularly of the pain iside of her ear and slight tenderness over the mastoid. We felt that possibly the tenderness was due partly to her neurotic condition. However, after waiting ten days, I had an *x*-ray picture taken which showed distinct cloudiness of all the cells of the mastoid on this side. The cells extended well forward into the zygoma. The blood count, a few days before, had been 26,000 white cells with 90% of polynuclear cells, but a tonsilitis, having developed, discounted this blood picture. Another blood count, taken at the time that the *x*-ray picture was taken, showed about sixteen thousand cells with 80% of polynuclears. I determined to open the mastoid, after numerous consultations in which I was told to delay, and found the entire mastoid diseased, and all the cells filled with pus. It was entirely exenterated, and the patient did fairly well. However, she was continually complaining of a severe pain around her ear, and a pain, neuralgic in character, radiating through her teeth and over her forehead. At the end of ten days, she left the hospital, the wound still continuing to discharge. We decided that it would be wise to reopen the wound and thoroughly clean out all the granulations. We were apprehensive of the condition of the zygomatic cells because, as stated above, the right zygoma was shown by the *x*-ray to be very extensive and had only been cleaned out as much as we thought necessary at the time of the operation. Her neuralgia responded fairly well to the analgesics that were given her, and finally an *x*-ray picture showed two buried molar teeth, which were probably the cause of her neuralgia to a certain extent. However, we could not exclude the possibility of some further infection either in the zygoma or possibly extending into the bone beyond the mastoid wound. Fortunately, the case has gone on satisfactorily, until at the present time there is practically no discharge from the wound, and the neuralgia has lessened. We expect that, within the course of a very few days, the wound will be entirely healed. Whether she will suffer from any condition that is there which has been covered over, it will be impossible for anybody to say, but we are in hopes that this is one of these indefinite cases which have fortunately gotten well without any further trouble.

Conclusions.

1. The number of cases of mastoiditis has been alarmingly large since January, 1920.

2. The majority of infections have been due to the streptococcus hemolyticus. Although this organism is morphologically the same as ever, there is evidence that its virulence is greater and that it has a peculiar ability to destroy bone beyond the mastoid region.

3. The zygoma, beyond the cells usually found, has been found diseased in many cases, causing a severe radiating neuralgia of a supraorbital character.

4. Symptoms simulating a localized meningitis, indefinite in nature and sometimes suspicious of meningitis lethargica (sleeping sickness) have been seen in many cases.

5. Examination of the eye-grounds is most important in suspected cases of sinus thrombosis. A choked disc often is found on the side on which the sinus is involved.

6. Laboratory examinations are of the utmost importance.

7. Transfusion (by the simple Unger method) was a life-saving measure in two of the cases cited.

2178 Broadway.

ROENTGEN DIAGNOSIS OF APPENDICITIS.

New York, August 23, 1920.

Editor, American Journal of Surgery:

In your editorial of the August issue, the roentgenologist has come in for a good part of the scolding, especially in relation to mistaken diagnosis in chronic appendicitis. Roentgenologists are no more infallible than their confréres, the clinicians and surgeons, in diagnostic acumen. The fault lies not only in the use of poorly trained and commercial *x*-ray men, but in certain physicians not making at least a tentative diagnosis before the patient is submitted to the roentgenologist. It is rather difficult for the *x*-ray expert to do all the thinking from both the clinical and the *x*-ray standpoints.

I believe many errors have been made in the past from the *x*-ray standpoint in considering a simple residue in the appendix at the fifty-hour period as indicative of appendicitis. It is the experience of many capable *x*-ray diagnosticians that a residue *in the cecum* at the above period is more diagnostic of chronic appendicitis than the appearance of a residue in the appendix. If the appendix is not visualized on the plate or screen there is always very strong evidence that the lumen is occluded by chronic inflammatory products.

Many roentgenologists assert, and with very substantial reasons, supported by operative findings, that many points in diagnosis of chronic appendicitis can be determined with good fluoroscopic and plate examination. I take the liberty to mention a few of these signs, direct and indirect: residue in the stomach after six hours, increased antral activity, reflex pyloric spasm, duodenal spasm, hypermotility, pain over cecum on fluoroscopic palpation, the residue in the cecum at 50 hours with possibly associated residue in the appendix at the same hour.

Chas. Winfield Perkins, M.D.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

NEW YORK, SEPTEMBER, 1920.

FATALITIES FROM MAXILLARY ANTRUM PUNCTURE.

Exploratory puncture of the antrum to determine the presence of an emypema of Highmore's cavity is so commonly performed with results so little disturbing to the patient that it is surprising to learn that in some cases the procedure has been attended with alarming symptoms, even death.

In the recently issued Volume II of the *Acta Oto-Laryngologica,* published in Upsala, Sweden, Dr. Reidar Gording of the University Hospital, Kristiania, Norway, has collected the reports on a number of serious complications associated with antrum puncture, and he relates also his own experiments on animals in an effort to determine the cause of the phenomena.

The first case reports that one has been able to discover in the literature are to be found in the article by Hans Claus*. He recites in rather insufficient detail the facts observed by him in four cases, two of which died. The nose had been cocainized in the usual way, the trocar was inserted, air was blown in with a bulb to determine the "cavity sound," when suddenly the patient fell prostrate, became cyanosed, had a very rapid pulse and contracted pupils, with shallow or no demonstrable respiration.

A typical instance is that of a young girl, age not given, whose right maxillary antrum had been twice syringed without unpleasant consequences. Immediately after the third syringing, cyanosis suddenly came on, with loss of consciousness, uncountable pulse, stertorous breathing and "fixed pupil." Notwithstanding the use of stimulants, artificial respiration, etc., death shortly supervened. The anesthetic employed was six drops of a ten per cent. novocain solution with three drops of adrenalin solution. Presumably this was not injected, but applied on a cotton pledget against the naso-antral wall. Claus assumes that death was due to novocaine poisoning, but he seems not to take into account that this drug is absorbed very slowly or not at all from mucous surfaces.

Barany, Hajek, Killian, Zarniko and several other authorities have reported untoward symptoms in the discussions before various medical societies, concurrent upon the attempt to irrigate the maxillary sinus by way of the inferior meatus.

Gording adds four cases of his own to those of various colleagues with whom he has discussed this subject. All of them were over fifty years of age. Three recovered within from a half hour to several days. One died. This fatal case was a strong, healthy mountain dweller of 61 years, accustomed to endure great physical exertion without ill-effects. Anesthesia was induced by twenty per cent. cocaine swabbed beneath the inferior turbinate on the naso-antral wall. The left antrum was then irrigated in the usual way, without mishap. This done, the needle was pushed into the right antrum and the rubber balloon bulb attached. There seemed to be a good deal of thick secretion in the way, so that considerable pressure was required to dislodge the mass of secretion that was plugging up the normal opening. No fluid had been used when suddenly the patient fell unconscious, became cyanotic and stopped breathing. Death seemed to have been instantaneous as there was no response to any efforts of stimulation or artificial respiration. No autopsy could be obtained, but an opening was made beneath the cheek through the canine fossa for exploratory purposes and the antrum was found of normal size. The puncture had been properly made, and there was no detachment of mucous membrane.

The cause or causes of this peculiar condition are possibly explainable on three grounds: First, air emboli are forced into the venous system; second, death is due to the local anesthetic; or, third, a nasal reflex is set up which carries back through the

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*Claus. *Beitr. z. Anatomie, Physiologie, Pathologie und Therapie des Ohres, der Nase und des Halses,* Bd. IV., Heft 1 & 2, 1910.

vagus to the vital centers in the brain. In the latter instance it is supposed that there is an irritation of the centripetal nerves in the nasal cavity, that is, the impulses go back through the olfactory or through the first and second branches of the trigeminal.

To determine, if possible, which of these hypotheses is most tenable, Gording performed a number of experiments on animals, especially Belgian hares, since these have a large maxillary sinus and weigh from 2,500 to 3,000 grammes. The gist of such conclusions as may be drawn is that while air emboli are possibly the cause in some cases, it seems more than likely that the nerve reflex is most culpable. The essayist draws a parallel between the nasal phenomena and those witnessed occasionally in inducing artificial pneumothorax. Some deaths have been reported during the latter procedure, and many investigators have thought that the reflex by way of the vagus is responsible for paralysis of the respiratory center.

In every case, it is very important to shrink down the tissue in the middle meatus so that the normal antral opening is rendered as free as possible before the puncture is undertaken. It is unwise to force air into the sinus. One can just as well arrange his technique so that fluid only enters the antrum and thus avoid the possibility of air embolism. The fluid will help to dissolve any mucous and thus the contents will pass out through the normal opening. In careful hands there ought not to be any danger from such an apparently harmless procedure as irrigation of the nasal antrum.—I. W. VOORHEES.

BONE TUMORS.

In Dr. Bloodgood's article in this issue of the JOURNAL will be found much solid information. Based on an analysis of 370 cases of bone tumor accumulated over a period of 27 years, it presents some important deductions not heretofore familiar, and it crystallizes other notions that have been more or less accepted. Some of these have been discussed in these columns and they seem to us important enough to deserve emphasis by repetition.

In an editorial in the JOURNAL fifteen years ago (June, 1905) the question was raised whether a conservative operative treatment of sarcoma of the long bones is not justified because—as Bloodgood so clearly states—amputation for "giant cell tumor" is unnecessary and for the other, more malignant sarcomata of the bones, it is almost always futile. The giant-cell central tumor can be cured by simple removal; the other bone sarcomata reappear not locally but distantly, usually in the lung. Bloodgood would advise amputation, therefore, only in those cases where the malignant tumor is so situated that resection and bone implantation is not feasible.

He stresses, too, an important dictum, viz: that amputation should never be performed until the diagnosis is established beyond a doubt, and again he advises exploration, if necessary, for the purpose. This teaching should be taken to heart: It is not always easy to determine without exploration and histologic examination the malignancy of a bone tumor; the differentiation, both clinically and roentgenographically, between bone cyst and central sarcoma may be quite difficult or impossible; finally, the mistake is made, oftener than it should be, of diagnosing bone syphilis as sarcoma.

Bloodgood advises early recourse to the roentgen ray, and study of the roentgen plates for purposes of differential diagnosis. We have more than once urged the importance to the surgeon of being able to interpret the tracings on the film. As a rule, nothing better than the roentgenogram can distinguish between syphilis, tumor, osteomyelitis even when clinical signs are doubtful and blood test fails. But to avail oneself of this highly important diagnostic information one must be familiar with the characteristics of these various bone affections as they appear in the roentgen plate*. Then he can satisfy himself, for example, that a given bone disease is syphilitic even though the roentgenographer, as has happened, reports "sarcoma" and the Wassermann reaction is negative!

Surgical Suggestions

Persistent pain in the back or in an extremity may be caused by a metastatic malignant growth (carcinoma, most commonly) in a vertebra. One should not make a diagnosis of "neuritis," "sacroiliac strain," "arthritis of the spine," or "sciatica" without a thorough examination of the patient's body for a possible primary growth. It must be borne in mind, too, that a neoplastic deposit in a vertebra may be scarcely recognizable roentgenographically until it has been present for a long time.

The débridement of wounds received in civil life is as much indicated as in those of war. It should not be performed, however, while the patient is in a state of shock. A systolic blood pressure as low as 80 is an absolute contraindication to operation.

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* Brickner—The Differential Diagnosis of Syphilis, Tuberculosis, Tumors and Osteomyelitis of the Long Bones, AMERICAN JOURNAL OF SURGERY, May, 1913.

Apparatus for suspension and traction are essential to the proper treatment of many fractures of the lower extremity and some fractures of the humerus. In fractures of the lower end of the femur the application of the Steinmann nail or Ransohoff tongs to the condyles is often the best means of securing alignment by providing the proper direction for traction. Moreover, it allows mobility of the knee-joint, which is very important.

Progress in Surgery

Selections from Recent Literature.

Edward Bleier, M.D., Abstract Editor.

Etiology of Bunions. J. J. Monahan, Chicago. *Medical Times*, July, 1920.

Monahan presents a careful and scientific study of the pathology and etiology of bunions. He discards entirely the theory that ill-fitting shoes or dislocation of the sesamoids is the cause.

Any comprehensive study of feet in stereo makes obvious the fact that an *ad*duction of the first metatarsal is accompanied by an *ab*duction of its first phalanx, which is so held in place by its muscular attachments that it cannot follow the new direction of its metatarsal. The abduction of the first phalanx results in a tightening of the inner tendon of the flexor brevis hallucis and a slacking of its outer tendon—which change in the tendons will necessarily be accompanied by a corresponding change in the position of the sesamoids. Even this resultant dislocation of the sesamoids, however, is extremely variable. In many extreme cases of bunions the sesamoids remain normal in their relationship to the rest of the foot although the first metatarsal may have become adducted entirely out of its normal position. In other cases where there is only a slight degree of bunion, or even none, the sesamoids show marked abnormality in their positions. It is plain that the fixety of their positions depends entirely upon the integrity of the sesamoid-encasing tendons, and bears no relationship to the movements of the metatarsal.

A bunion-deformed foot shows in stereo *x*-ray three abnormal conditions.

1. An abduction of the proximal phalanx of the great toe and a dislocation of this phalanx from its normal articulation with the head of the first metatarsal to the external lateral portion of that head.

2. An enlargement of the internal lateral portion of the distal head of the first metatarsal—the bunion proper.

3. An adduction of the first metatarsal.

The first two conditions are a result of the third, and an analysis of this latter is the most important factor in determining the causation of bunions.

An examination of the tarso-metatarsal articulation in a bunion-deformed foot shows that the adduction of the first metatarsal is caused by the abnormal size and shape of the internal cuneiform.

Normally the internal cuneiform should terminate anteriorly at the anterior border of its articulation with the second metatarsal. Only by such termination can an adduction of the first metatarsal be avoided. In this bunion-deformed foot the internal cuneiform extends far past this articulation, overlaps the second metatarsal and by its excessive wedge-like development produces an extreme adducation of the first metatarsal.

From a further study of many plates, all of which show the development of this wedge in various conditions of fusion with the surrounding elements, the conclusion is drawn that it is the development of an independent supernumerary bone within the first tarso-metatarsal articulation that causes the adduction of the first metatarsal. In all cases the degree of bunion produced is in direct ratio with the size of the supernumerary structure.

These are the author's conclusions:

A supernumerary, wedge-shaped bone growing within the first tarso-metatarsal articulation is the direct cause of the adduction of the first metatarsal, and hence of bunions.

The degree of bunion produced is direct in proportion to the size of this wedge.

The wedge may be fused with the first metatarsal, the internal cuneiform, or both; or it may be entirely free. It is most frequently seen fused with the internal cuneiform.

From a comparison of the two structures, it is apparent that this wedge is the product of the same ossification center that in a slightly different anatomical position develops as the "os intermetatarsum."

Though found in various locations in the immediate environs of the first tarso-metatarsal joint, it is only when the supernumerary bone develops directly within the articulation that it adducts the first metatarsal and produces bunions.

The Surgical Treatment of Bunions. C. H. Mayo, Rochester, Minn. *Minnesota Medicine*, July, 1920.

Mayo discusses the pathology and treatment of bunions. Hallux valgus is a very common deformity in which the great toe overlaps or compresses the second and third toes. It is often associated with some degree of bunion. Bunion, except of the bursal type, rarely occurs without hallux valgus. The overgrowth of bone on the inner side of the first metatarsal bone is immediately back of the articulation. This has been generally attributed to intermittent pressure; nevertheless in an *x*-ray picture of the foot with severe hallux valgus and deformity from bunion shows a wide space between the heads of the first two metatarsals. If the growth of bone were due to an intermitten pressure bony deformities would occur in other regions subjected to intermittent pressure, for example, on the shoulder of the hod-carrier or beneath the collar of the work horse. It is probable that this overgrowth at the terminal whirls of the capillary circulation where the joint capsule is attached to the periosteum is of the same origin as the overgrowth which occurs in rheumatoid arthritis, a mild chronic infection, the localizing factor being that of traumatism, since such growths occur and increase during the period of life in which rheumatism and recurring infections occur. The various shapes of feet and the limited number of shapes of shoes are undoubtedly responsible for the development of bunions and hallux valgus, conditions which occur more commonly in feet in which the great toe is longer than the second and third supporting toes, since the leverage action of the misshapen pointed and too short shoe turns the joint outward. Bunion rarely occurs on a foot whose great toe is shorter than the second and third toes, namely, the square foot.

There are several methods, according to the condition, of the treatment of bunion:

1. Simple excision of the bunion bursa. Few operations are done in this early stage.

2. Excision of the bursa with removal of the inner side of the head of the first metatarsal.

3. The removal of all, or nearly all of the head of the first metatarsal. This procedure is too radical.

4. The Keller operation in which the bony growth and the bursa are removed. Tendon relaxation is secured by removal of the concave articulating surface of the first phalanx.

5. The Robinson operation for removal of the sesamoid bones, the bunion bursa, and by means of bone forceps, the removal of the overgrowth of bone.

6. The usual operation performed for the relief of

bunion is one advocated many years ago for shortening the great toe and relaxing the extensor tendon; one-quarter inch of the articulating surface of the head of the metatarsal bone is removed and motion is maintained by turning the bunion bursa into the joint in front of the divided bone surface after the removal of the bony overgrowth.

Persons with hallux valgus and normal or possibly lowered arches are operated on by making a curved incision convexly upward over the inner side of the joint. The skin is deflected downward, the bunion bursa is dissected forward and the joint opened, the bursa being left attached to the inner surface of the first phalanx. One-quarter inch of the head of the articulating surface is removed by bone saw or large bone-biting forceps. This relaxes both extensor and flexor tendons. The bony projection on the inner side of the head of the great toe is removed and the bunion bursa turned into the joint and held by sutures of catgut which also serve to straighten the great toe, thus removing the valgus. The wound is closed without drainage. If the bunion is complicated by a marked flat-foot and hallux valgus, the Robinson operation of removal of the sesamoids is indicated; the incision is the same, and the bunion bursa with the bony overgrowth are removed. If the great toe is bent downward the white flexor tendon with the yellower surface of the sesamoids may be seen on each side of it. These bones can be removed with a knife or sharp pointed scissors if they are grasped with strong tenaculum forceps. In some cases of marked hallux valgus the extensor tendon should be lengthened.

The Immediate Suture of Accidentally Divided Tendons. N. A. Powell, Toronto. *Canadian Medical Journal,* August, 1920.

The first principles in traumatic tendon surgery are sterilization without added irritation, then the localization, coaptation, and suture of the divided ends, relief of all tension, immobilization, and finally restoration of function. Regarding the preparation of the wound area, watery solutions should be excluded. The iodine-gasoline solution 1 in 1,000 followed by 3 to 4 per cent. tr. iodine *on the skin only,* stands the test of continued use.

Paraffin oil, *B.I.P.*, and best of all Dichloramin-T have all helped at times. Where infection cannot be avoided the last named antiseptic may save the situation.

Ether flooding of the wound has given such good results in the traumatic surgery of large joints that we are now giving it a trial with encouraging results.

Exceptions to the rule that *every* divided tendon should be sutured *at once* are almost negligible. They *may* unite without suture since nature is competent to fill in a gap in tendon if the sheath is not closed by inflammation or pulled apart by muscular action or by too early passive motion. The chance of strong union and good function is vastly improved by accurate suturing, and this should settle the question for us.

The method of suture is as follows:

The ends of the tendon are clipped at their edges and controlled by mosquito forceps. Looped lateral sutures on two aspects next co-apt the stumps. To take the tension off these an S-shaped suture is next passed. It lies in the tendon just as the letter S lies in the parallel lines when we make the $ sign.

Treatment of Acute Polyarthritis. Samuel W. Boorstein, New York. *Medical Record,* July 17, 1920.

Boorstein outlines the methods followed at the Montefiore Home, in the treatment of acute polyarthritis. His conclusions are:

1. The disease has no relation at all to rheumatism and antirheumatics should be avoided.

2. A focus of infection should be looked for in every case of arthritis where tuberculosis, malignancy, or trauma is not self-evident. The finding of one focus does not mean that this is the only one. The source of infection suspected should be removed if possible.

3. A monoarticular arthritis demands the same careful investigation as does a case of polyarthritis, for one can never tell when the former may merge into the latter.

4. Prophylaxis in preventing any systemic infection and keeping the genitourinary and intestinal tracts in good condition is essential. Removal of chronic foci anywhere in the body is imperative as a prevention of progressive ill-health.

5. The arrest of infection does not mean that the joint will be cured, unless orthopedic measures are employed.

6. General treatment, such as good hygiene, good food, tonics, and building up of the patient, is essential to success.

7. Acute joints should be put in well-padded plaster casts for rest.

8. When active symptoms subside, local treatment to the joints, in the form of active and passive hyperemia, hydrotherapy, massage, active and passive exercises, should be administered regularly with great care and patience and kept up for a long time.

9. The occurrence of deformities should be prevented by steadying the joints in proper position at the time of the acute infection.

Value of Radium in the Treatment of Bladder Tumors. J. T. Geraghty, Baltimore, *Southern Medical Journal,* July, 1920.

Geraghty traces the development of the treatment of bladder tumors, noting the marked advance made with the introduction of fulguration, and later radiation. The author says that the majority of malignant papillomata, respond to fulguration alone. But it is also true that all papillomata, benign or malignant, including papillary carcinoma which is so resistant to fulguration, usually respond to vigorous radiation. It is most important therefore to distinguish between papillary carcinoma and the other malignant tumors, because the papillary carcinoma is for practical purposes the only one which does not yield to radiation. Cystoscopic evidence is usually sufficient without resorting to section.

Cystoscopy.—It is surprising how frequently from cystoscopy alone one can distinguish the papilloma from the papillary carcinoma. It is impossible from the cystoscopic appearance of the papilloma to determine whether it is benign or malignant. When, however, the malignant changes are so advanced that infiltration of the bladder wall has occured, there are certain cystoscopic appearances which nearly always enable one to arrive at a fairly accurate diagnosis. The presence of necrosis in the papillæ is indicative of carcinoma, and is usually associated with invasion of the underlying bladder wall. In the earlier stages, when the tumor has just begun to invade the bladder wall, it may not be possible cystoscopically to determine this point; but when the process is at all advanced, the tumor loses its pedunculated character and becomes sessile in type. Frequently, around the margin of the tumor is seen edema, or bullæ, which are usually indicative of a cancerous invasion of the bladder wall below. At other times little tumor nodules can be seen beyond the main tumor growth. This again is indicative of cancer. While it is impossible definitely to describe all the appearances which serve to differentiate the papillary carcinoma from the malignant papilloma, the cystoscopist of experience is usually able to make the distinction, and it is interesting to note how frequently the cystoscopic diagnosis proves to be correct.

Geraghty presents the following conclusions: While benign and malignant papilloma and the early papillary carcinoma disappear under the influence of radium, the infiltrating types have proven very resistant to this agent. It is our procedure, therefore, when the infiltrating character of the growth has been determined and when the tumor is sufficiently localized to permit of complete removal, to carry out a radical resection. Following the removal of an infiltrating papillary carcinoma, cystoscopy should be done at an early date, as the not infrequent recurrences will yield promptly in many instances to radium, notwithstanding the resistance of the primary tumor. It is of interest to note that the use of radium has not diminished the tendency of bladder tumors to recur, recurrences being observed in about 30 per cent. of the cases treated. The recurrence, however, responds to radiation in most instances. Radium has certainly proved to be a valuable aid in the treatment of bladder tumors, and while results in the infiltrating types are far from satisfactory improved technic may eventually solve the problem.

Renal Calculus with Negative X-Ray Findings. A. Hyman, New York. *Boston Medical and Surgical Journay*, July 15, 1920.

Hyman reports four cases. In two of the cases the stones were latent, causing no symptoms and discovered only at autopsy. In all four cases the chief chemical constituent was ammonium urate. Hyman draws the following conclusions: These four cases serve to illustrate several interesting facts: 1, Negative radiographic findings in renal lithiasis are not infrequent, four such cases being observed within the period of a few months. 2, Latent kidney stones are also not uncommon; in two cases there were no symptoms referable to the side on which calculi were found. 3, The chemical analysis showed urates to be the predominating constituent in all four cases. 4, The passage of a ureteral catheter unobstructed into the pelvis of the kidney does not prove the absence of a ureteral calculus. 5, The wax-tipped bougie is of value; it will every now and then demonstrate the presence of a stone when other means fail. 6, Conservation should be the watchword in all operations upon the kidney. Nephrectomy should be practised as a last resort, for despite negative radiograms, and absence of symptoms, the opposite kidney may be the seat of calcareous disease.

Uretero-ureteral Anastomosis. Reuben Peterson, Ann Arbor, Michigan. *Surgery, Gynecology, and Obstetrics*, August, 1920.

The author reviews the literature of this uncommon operation, comparing the published methods and results, and presents a case of his own, in which the ureter was accidentally cut during a pan-hysterectomy. Peterson makes the following statements as the result of his investigations.

1. No case of uretero-ureteral anastomosis can be classed as cured or successful until so proved by the most modern exploration of the repaired duct and the corresponding kidney.
2. A study of the literature of ureteral anastomosis by various methods, shows that anastomosis by the end to end, end in end, and end in side methods is a perfectly feasible procedure.
3. Not only can the duct be made patent with little or no stricture, but a functionating kidney and ureter can result.
4. In skilled hands the primary mortality due to any one of the three methods should be very small.
5. Leakage after the uretero-ureteral anastomosis in large majority of cases, probably means failure, since it usually leads to stricture, hydro-ureter, and hydronephrosis.
6. Judged from this standpoint the invagination methods are preferable, to the transverse end to end methods since they are followed by fewer cases of leakage.
7. The end in end method of anastomosis is the operation of choice, since it is extremely simple, and sacrifices the minimum amount of ureter.
8. Evidence shows that every uretero-ureteral anastomosis no matter how perfect may be the surgical result, will be followed by a slight degree at least of hydro-ureter, and hydronephrosis. This last claim, however, should have further substantiation.

The Complement Fixation Test in Gonorrhea. W. Magner, Cork, Ireland. *The Lancet*, July 17, 1920.

The problems rquiring elucidation in reference to the complement fixation test for gonorrhea are stated as follows:

1. Whether in all cases of gonococcal inflammation antibodies can be detected in the serum, or whether such inflammation may exist without the necessary antigenic stimulus reaching the healthy tissues.
2. Whether, when once the tissues are incited to form antibodies, such formation continues until the organisms are destroyed, or whether, the acuteness of the inflammation having subsided, the latter may lie dormant but potentially virulent without exerting any further stimulating action on the body cells.
3. A point of subsidiary importance is the approximate determination of the length of time during which antibodies persist in the serum after destruction of the organism.

Two hundred cases were studied in the investigation. The technic is minutely described. The conclusions are:

1. The complement-fixation reaction will prove of real value both in the diagnosis of gonorrhœal infections and in the determination of the period of infectivity.
2. It is probable that with more accurate information as to the serological types of the gonococcus a more sensitive antigen will be available and still more specific results obtained.
3. Negative results are common during the first 10 or 12 days of the discharge. After this period the great majority of cases react positively. Positive results may, however, be obtained as early as the fourth day.
4. A certain number of mild cases in which the infection appeared to be limited to the anterior urethra reacted negatively through the attack.
5. The more extensive the inflammation the greater the probability of a positive result. Cases showing systemic complications invariably give such a result.
6. The complement-fixing antibody persists in the serum for about three months after destruction of the organism, during which period the reaction remains positive.
7. The administration of an autogenous gonococcal vaccine during the course of treatment does not lead to a greater persistence of antibodies, the serum becoming negative in about the same period after the final injection.
8. The criterion of cure and non-infectivity is therefore a change in the reaction from positive to negative three months after disappearance of all symptoms and cessation of all treatment.

Hemorrhage Following the Operative Treatment of Internal Hemorrhoids. W. B. Gabriel, London. *The Lancet*, July 17, 1920.

This paper analyzes the cause of post-operative hemorrhage in 500 cases operated at St. Mark's Hospital. The author distinguishes between intermediary hemorrhage, occurring within 24 hours after operation, and secondary hemorrhage occurring later than 24 hours. There were three cases of intermediate hemorrhage, two following ligature operations and one following a Whitehead operation. The cause is either slipping of a ligature or failure to tie a small vessel. The treatment is that of hemorrhage in general, and locally plugging the rectum with a vulcanized tube.

Secondary hemorrhage is an uncommon complication which cannot be anticipated, and unless the possibility of its occurrence is kept in mind, a large concealed hemorrhage may occur before the condition is recognized. In this series 5 cases of serious secondary hemorrhage followed a ligature operation, 4 on the seventh and 1 on the eighth day after operation. In addition there were 8 other cases of slight secondary hemorrhage after defecation, of no special consequence and requiring very little treatment; 7 of these followed a ligature operation.

A secondary hemorrhage is brought about by premature separation of the sloughing pile. After the ligature operation the ligatures separate normally between 8 and 12 days after operation. In this series the average date of the secondary hemorrhage has been seven days after operation. The chief factors in the causation of the hemorrhage are: (1) Infection, (2) trauma, (3) anemia and general debility. To these may be added, rarely, (4) blood diseases such as hemophilia.

Conclusions: 1. Severe secondary hemorrhage following a ligature operation for internal hemorrhoids is a possible complication, occurring in this series at the rate of just over 1 per cent. of cases—5 in 470. The rectum necessarily becomes a septic area when the bowels are opened three days after operation, and it is difficult to see how the risk of a secondary hemorrhage from sepsis can be further eliminated.

2. The average date for the hemorrhage is seven days after operation.

3. The hemorrhage usually follows an action of the bowels, hence in the post-operative treatment the prevention of constipation is of the greatest importance in minimizing the risk of trauma.

4. The bleeding tends to be concealed, and a suspected case of hemorrhage should be investigated without delay with a tubular speculum.

5. Plugging the rectum with a vulcanite or rubber tube is the most generally efficient method of controlling the hemorrhage, which is to be combined with suitable general treatment.

The Use of Radium in Gynecology. William C. Gewin. Birmingham, Ala. *Southern Medical Journal,* July, 1920.

Gewin gives his experiences during the last ten years with the use of radium, laying special stress on accurate technic. His conclusions are here presented:

1. Radium is the treatment of choice: (a) in cases of menorrhagia of menopause not associated with large fibroid tumors, and in which the possibility of carcinoma has been definitely eliminated; (b) cases of menorrhagia in patients between the ages of 35 and 40 years of age who have small sized mucous fibroid tumors with no demonstrable evidence of malignant conditions existing; (c) cases of myomas in which there is a contraindication of operation; and (d) cases of menorrhagia in young persons who have resisted all medical treatment.

2. In all cases with a malignant tendency.

3. In all operable cases after a complete surgical extirpation of all cancer possible as a prophylactic and also to destroy such cancer cells as can not be removed by the surgeon.

4. In all inoperable cancers of the uterus radium will relieve the pain, eradicate the offensive odor from the discharge and stop the hemorrhage, and in many cases produce an anatomical and symptomatic cure when the patient seems to be moribund.

5. Radium will render operable many cases that are inoperable.

6. The use of radium is practically the only means of relief in cases of recurrent carcinoma of the uterus.

7. In the use of radium it is very essential that one have a thorough knowledge of the technic of its application and of its physical properties as modern scientific research has given it to the profession.

Necrotic Fibroids Complicating Pregnancy and the Puerperium. George W. Kosmak. New York. *New York State Journal of Medicine,* August, 1920.

Kosmak presents five cases of this type, describing the operations performed. From his observations, he draws these conclusions:

1. Patients presenting myomatous tumors of the uterus associated with pregnancy must be carefully watched for evidences of local necrosis during the entire period of pregnancy and the puerperium as the breaking down of the tumor may occur at any time during the period noted.

2. If necrosis is present in such cases the possibility of operation must be considered. No reference is made to tumors that may possibly obstruct delivery but are not in themselves involved in any degenerative process.

3. Exploratory laparotomy under deep anesthesia with enucleation of the growth and careful suture of the uterine wall can be carried out without extensive hemorrhage, producing abortion or premature delivery, if the patient is kept well narcotized after operation. Although recommended by various authors, hysterectomy need not always be done. Even if abortion follows operation the uterus will be left for possible future pregnancies.

4. Uterine myomata undergoing degeneration during the puerperium, as shown by local pain and tenderness, elevation of temperature, continuous red lochia and possible signs of peritonitis, should likewise be considered for exploratory operation, in the hope that the tumor may be enucleated before perforation of its capsule takes place. In the case of pedunculated growths, this procedure must likewise be followed. With multiple fibroids, hysterectomy must often be considered.

An Operation for the Radical Cure of Inguinal Hernia. George Woolsey, New York. *New York Medical Journal,* July 3, 1920.

Woolsey described his operation for inguinal hernia, which he has practiced for twenty years. He had not heretofore published the method, because he believed it identical with Andrews' operation.

The main features of this method of operation are obliteration of the inguinal canal and the external abdominal ring, and fortifying this part of the abdominal wall by: 1, suture of the entire thickness of the musculoaponeurotic wall, along the upper or inner margin of the incision to the deep surface of Poupart's ligament; 2, by overlapping the lower flap of the external oblique aponeurosis in front of the upper flap and, 3, transplanting the cord so it will lie superficially to the aponeurosis.

The main object and most important result of bringing the cord out at the upper and outer end of the incision is to enable one to obliterate the external ring and to make a firm closure of this potentially weak part of the abdominal wall, by carrying the suturing of the musculoaponeurotic flap to Poupart's ligament and the imbrication of the aponeurosis continuously to the pubic bone. Toward the inner end of this suture line the sheath of the rectus is included in the suture, and in direct hernias it may be necessary to relax this by a liberating incision, or to turn down a flap from it to allow satisfactory approximation to the inner end of Poupart's ligament. The outermost suture through the conjoined tendon narrows the internal ring, care being taken not to compress the cord too snugly. The cord is brought out forward and then is deflected upward by the overlapping lower flap of the external oblique aponeurosis, so that it passes somewhat obliquely forward and upward and then becomes superficial. Andrews places the cord between the two imbricated layers of the external oblique aponeurosis because he does not like to lose "the valvular arrangement of the passage of the cord."

Pleural Disease in Infants and Children. With Special Reference to Empyema. Harry Lowenberg, Philadelphia. *New York Medical Journal,* July 24, 1920.

In diagnosis of the presence of fluid in the chests of infants, percussion yields much more accurate information than auscultation. The sense of resistance, and a widespread area of dullness, without very acute dyspnea indicate the presence of fluid. Aspiration should be performed in the space where the fluid has been indicated either by physical signs or the *x*-ray. The author outlines the treatment of empyema at Mt. Sinai Hospital in Philadelphia.

Late Hereditary Syphilis—Membranous Pericolitis, Perienteritis, or Chronic Abdominal Syndrome. Mariano R. Castex and Delfor del Valle, Buenos Aires. *Surgery, Gynecology and Obstetrics,* August, 1920.

The authors present a thesis supported by a large quantity of clinical material in which they attempt to prove the syphilitic origin of pericolic membranes. They take a stand in direct opposition to Lane, whose theory of mechanical causation the writers contradict. Some of their conclusions are here presented:

Hereditary syphilis is a frequent cause, perhaps the most frequent, of membranous perienteritis, and analogous conditions. Its pathogenesis is complex, as several factors contribute towards the condition. These are defects of conformation in the abdominal wall, because of the faulty endocrine function which presides over and governs their development. These malformations on the one hand, and the abnormal function of the nervous system due to endocrine deficiencies produce defects in the gastrointestinal statics and dynamics. As a consequence of the latter, we have intestinal stasis which brings on chronic inflammation of the colon. From the wall of the colon, the inflammation spreads to the surrounding serous membrane, aggravating the existing congenital lesions. The primary cause of all this is hereditary syphilitic infection, generally in the form of a late manifestation. These cases, first of all, should receive mixed anti-syphilitic treatment. The surgical treatment is not to be abandoned, but is to be restricted to cases in which definite indications confirmed by clinical and radiological diagnoses, point to mechanical alterations of importance, such as kinks, adhesions, etc., or to co-existing lesions of adjacent organs: ovaries, tubes, appendix, gall bladder, duodenum, and stomach. Surgical treatment should consist in separating the membranes, and in molding and mobilizing the peritoneum, together with careful peritonization and removal of the adjacent affected organs. Cases in which the patient suffers from chronic abdominal symptoms, without any lesion of importance, should be considered as types of "sympathicopathy" owing to particular deficiencies, more or less marked, of the endocrine glands. It is important to know this type of chronic abdomen, for it involves a prognosis and management very different from the membranous perienteric type. The prognosis depends on the anatomical and clinical type, and the period and stage of the affection. It is good in cases of early diagnosis and rational treatment; less favorable in those of late diagnosis where rational treatment is impotent in modifying chronic lesions already well developed. In these a more or less pronounced improvement is to be obtained in carrying out suitable surgical treatment.

Book Reviews

Pathologische Physiologie des Chirurgen. (Experimentalle Chirurgie.) Ein Lehrbuch für Studirende und Aerzte. Von. Prof. Dr. Franz Rost, Oberarzt der Chirurgischen Universitatsklini Heidelberg. Octavo; 613 pages; illustrated. Leipzig: F. C. W. Vogel, 1920.

It seems odd that in these days of frenzied publication an author is able to find a theme that is not only unhackneyed but fills a definite need. Internists have long been familiar with Krehl's "Pathological Physiology," a book that has fulfilled its mission many times over and it seems strange that no one should have hitherto thought of writing a book comparable to "Krehl" for the benefit of surgeons. Rost has accomplished this admirably. Employing a regional classification, he discusses the pathological physiology of all diseases that may enter the domain of surgery; also the local and general effects arising after all the recognized operations upon these organs. The exposition is systematic; the literature is extensively utilized and the discussion is tempered by a discerning critic. Inasmuch as the majority of surgical diseases fall at some time or another within the scope of the internist, this book is equally as valuable to the latter as to the surgeon. This treatise is an excellent example of what a "borderline" medical work should be. It is not only one of the most informative books we have been privileged to review in recent years, but also one of the most valuable for purposes of reference and research. It is a pleasure to be able to add that the author writes an unusually uninvolved German.

The Dawn of Modern Medicine. An Account of the Revival of the Science and Art of Medicine which took place in Western Europe during the Latter Half of the Eighteenth Century and the First Part of the Nineteenth. By Albert A. Buck, B.A., M.D., Formerly Clinical Professor of Diseases of the Ear, Columbia University, New York, Consulting Aural Surgeon, New York Ear and Eye Infirmary, etc. Octavo; 288 pages; illustrated. New Haven: Yale University Press; London: Humphrey Milford, Oxford University Press, 1920.

This book is in a measure a continuation and amplification of the author's "The Growth of Medicine," published a few years ago. The final chapters of this work were avowedly incomplete owing to the inaccessibility of historical records. This difficulty has now been overcome and, strange to say, under peculiar and interesting circumstances. The records which Dr. Buck required were found in sufficient number in the Transylvania College in Lexington, Kentucky. The collection had been purchased in Paris in 1819 and were placed at Dr. Buck's disposal.

This volume is not a connected discourse; nor is there any attempt, except in few particulars, to trace trends or tendencies. The discussion is largely biographical, the lives and work of some of the most important members of the German, French, Italian Viennese and English schools occupying most of the book. Nor has there been any attempt at completeness, for reasons that no doubt are deemed by the author sufficient. Many names of the first magnitude are omitted. The book therefore is rather a series of essays than a history, and leaves one with the impression of the "Dawn of Modern Medicine" as a series of snapshots rather than an orderly and well planned recital. Dr. Buck's manner of writing is familiar. He is always lucid and scholarly. Sometimes the biographical notes miss the insight and significance of the life-work of the individual; oftentimes we miss the human touch. But when all is said, Dr. Buck's labors have been eminently worth while and he has given us a valuable and very readable book.

Pathogenic Microörganisms. A Practical Manual for Students, Physicians and Health Officers. By William Hallock Park, M.D., Professor of Bacteriology and Hygiene, University and Bellevue Hospital Medical College and Director of the Bureau of Laboratories of the Department of Health, New York City, and Anna Wessels Williams, M.D., Assistant Director of the Department of Health: Consulting Pathologist to the New York Infirmary for Women and Children, assisted by Charles Krumwiede, Jr., M.D., Assistant Director of the Bureau of Laboratories; Assistant Professor of Bacteriology and Hygiene in the University and Bellevue Hospital Medical College, New York City. *Seventh Edition.* Octavo; 747 pages; 214 engravings and 9 plates. Philadelphia and New York: Lea & Febiger, 1920.

This admirable work has kept pace with its subject and each new edition has maintained its popularity. The last preceding appeared three years ago. This, seventh edition incorporates information acquired during the war concerning organisms pathogenic for the respiratory system, anaerobic wound infections, typhoid and paratyphoid preventive inoculations, etc. Other parts of the work have also been more or less rewritten and much new matter has been included among them.

Experimental Pharmacology. By Hugh McGuigan, Ph.D., M.D., Professor of Pharmacology in the University of Illinois, College of Medicine, Chicago, Illinois. Octavo; 245 pages; 56 engravings and 7 colored plates. Philadelphia and New York; Lea & Febiger, 1919.

This manual is concise yet comprehensive. Particularly notewothy are the explanations of the physiological, anatomical, chemical and physical principles—where they are known—on which the experiments rest, and which accompany the empirical directions throughout the book. Experimental comparison of the actions of drugs is the basis of the book, and in every possible case, the work is done on the student himself.

The 56 figures are anatomical diagrams and illustrations of technique. The 7 colored plates are charts, which indicate the actions, comparative and otherwise, of drugs. The drugs are classified according to the system upon which they exert their most important action; caffein is found under drugs acting on the kidney and digitales under the pharmacology of the heart.

A very striking feature is the poor English from which the entire work suffers. Complete revision from this standpoint would be desirable.

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SAFETY METHODS IN THE CARE OF SURGICAL PATIENTS.

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The writer has been led to prepare this paper by the receipt of the following letter addressed to him by a surgeon well known in Europe as well as in the United States:

> ——— November 20, 1916.
>
> My dear Doctor Kellogg:
>
> For about five years I have been operating at ———. I have been struck by the uniformly favorable reaction in operative procedures under the hydrotherapeutic treatment that they apply before, during, and immediately after the anesthetic. I have understood that it is a treatment following the lines of procedure established at your institution. Have you anything in pamphlet form, or anything to which you could refer me, that explains scientifically why those patients uniformly promptly recover their circulation, are quickly restored to normal, the pain caused by gas in ordinary cases eliminated, and almost invariable recovery without apparent shock or ether-pneumonias?
>
> Yours very truly,
>
> ———

Many other surgeons visiting the Battle Creek Sanitarium Hospital having shown a like interest in the methods followed in our surgical wards, I thought it might be worth while to present in this form a somewhat detailed account of them. I do not claim, by any means, that all are new or original, although the writer believes himself to have been a pioneer in the adaptation of hydriatic methods to the care of surgical cases, and in many features of the pre-operative and post-operative feeding of such cases, especially with reference to acidosis and intestinal asepsis.

Most of the special procedures which I and my colleagues employ in the care of our surgical cases have been in use by us for many years. The chief of them were put in operation nearly thirty years ago and were described in a paper published in 1895.* New features have been added from time to time as the result of experience and observation of the work of others, suggestions of assistants, of intelligent nurses and, sometimes, suggestions made by patients themselves.

I am especially indebted to my surgical colleague, Dr. James T. Case and our hospital physician, Dr. Bertha Moshier. for many valuable hints, and especially for the systematic carrying out of measures found to be valuable.

In the following description of these methods, special emphasis has been laid upon points in which there is an essential departure from routine methods that are universally employed, references to which are, for the most part omitted, to economize space.

PREPARATION OF THE PATIENT.

In emergency cases, the preliminary preparation is of necessity brief, and sometimes will consist of nothing more than the application of the necessary means to avoid sepsis. But when haste is not necessarily involved, much can be done to lessen the risk of complications and to improve the results of operations, by a period of special preparation which may profitably occupy from 24 to 48 hours in nearly all cases, and in abdominal cases a week. In special cases, several weeks may be most profitably employed in getting ready for the ordeal of a severe operation, especially in improving the patient's metabolism and changing the intestinal flora. Patients who come to the operating table with badly coated tongue, foul breath and other symptoms of intestinal toxemia, are much more likely to suffer from shock, collapse, renal failure, pronounced acidosis, anemia, peritonitis and other complications, and make slower recoveries than those who come with a clean tongue and a sweet breath.

First of all, the patient is subjected to a thoroughgoing physical examination, after a careful clinical history of the case has been taken. This includes, in addition to routine methods, the following: A fluoroscopic examination of the chest; a blood count, estimation of hemoglobin, and differential count of leucocytes; a chemical examination of the blood for non-protein nitrogen, uric acid and sugar; a Wassermann test and, if indicated, other serological tests; examination of the heart and bloodvessels and determination of the systolic and diastolic blood pressure; a bacteriological examination of the blood; a quantitative examination of the urine, including a determination of the total nitrogen and of the ammonia content, of indican and other conjugate sulphates, and of the acidity by the hydrogen-ionic method; determination of the urinary efficiency by the phenolphthalein test, or better, the urinary test ration; determination of the CO_2 tension of the residual air with reference to acidosis; careful examination of the nose, throat, mouth and teeth, with reference to focal infection; investigation of vaginal and other secretions, with reference to possible focal infection; a determination of the motility of the alimentary canal by means of the charcoal or carmine test, and, in case of abdominal operations, a barium meal and *x*-ray examination of the entire alimentary canal.

An electrocardiographic tracing is made together with a careful study of the heart in relation to myocarditis or other grave organic changes whenever there is reason to suspect the presence of these conditions. A determination of the heart efficiency and of the vascular tone is also made by means of exercise and posture tests.

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* Intestinal Asepsis and Antisepsis in Abdominal Surgery.

A patient with low pressure needs to have a reenforcement of heart energy and an increase of blood volume before going upon the operating table. This may be secured in most cases by proper feeding and by graduated cold baths administered twice daily, beginning with cold mitten frictions or towel rubs, increasing the vigor of the applications from day to day, as reaction improves. Copious water drinking, the fresh air cure and the milk regimen, massage and automatic exercise are other useful measures.

High blood pressure may be lowered by rest in bed, low protein diet and withdrawal of all pressure-raising toxins, as tea, coffee, tobacco, alcohol, and condiments of all sorts and by changing the intestinal flora.

Rest in bed and automatic exercise of the muscles applied daily are also highly effectual measures for lowering blood pressure. Improvement is often shown by a lowering of the diastolic pressure, even when the systolic pressure remains the same. This increases the pulse pressure and the blood movement and so lessens the load upon the heart and prepares it for the strain of the operation.

Careful note is made of the patient's physique. The chest capacity is determined not only by the spirometer and the tape line but by the dynamometer. The total strength of the patient, as well as of each individual group of muscles, may be determined by the aid of the "universal dynamometer."

Highly important information is obtained by the determination of the patient's metabolism by the aid of the Tissot, Benedict, or some similar respiration apparatus adapted to clinical work.

A thorough knowledge of the patient's condition obtained by such an examination as the foregoing renders possible a just estimate of his ability to withstand the ordeal of an operation and of the possible complications to be guarded against.

Such an examination also affords an opportunity to greatly enhance the patient's chances for recovery and for a successful operation, by correcting any existing defects that may be observed.

The deaths that occur in cases confidently expected to recover are often due to causes that might have been discovered by a careful examination of the sort above outlined, and might have been avoided by the special precautions which such an examination would have suggested.

Measures that greatly add to the safety of severe operations and contribute to the comfort of the patient naturally fall into three groups, 1. Those that precede the operation; 2. Those that are applied during the operation; and 3. Those that follow the operation.

MEANS THAT INCREASE GENERAL VITAL RESISTANCE.

Many years ago Benjamin Ward Richardson suggested that many deaths following operation are due to the fact that the patient belongs to a class of persons whom he termed the *morituri*, that is, persons who because of general low vital resistance or some special weakness are ready to succumb to any severe strain upon their vital resources. Unquestionably, the ability to survive a severe surgical operation differs in different persons and in the same person at different times. Hence, it is reasonable to believe that all measures by which the patient's resistance may be improved are of importance as means of prepration for the ordeal.

The value of certain hydriatic measures as means of increasing vital resistance has long been known Currie, more than a hundred and twenty years ago called attention to the stimulating effect of cold baths, and sagaciously remarked that "It is not the cold which stimulates, but the sensation which the cold produces." That is, the stimulating effect of cold is produced by the reflex effects set up through impressions made upon the thermic nerves. This is the rationale of the general stimulating effect of short, cold frictions, especially the mitten friction and the towel rub. Such applications are followed by a reaction in which the activity of the bloodvessels of the skin are enormously increased.

Through reflex action, these applications of cold to the skin are accompanied by similar effects upon the circulation of the viscera. After a general short, cold application, the heart acts with greater vigor and the movement of the blood throughout the viscera and all other internal parts is greatly accelerated.

These short, cold applications have a powerful tonic effect upon the heart. Cold applications also quicken and deepen the respiratory movements. The chest is more fully expanded than usual. Residual air is driven out and the volume of the tidal air increased. The beneficial effect upon the nervous system is shown in the marked increase in muscular tone following a tonic application of cold water such as a towel rub, a mitten friction, a sheet rub or a cold douche. After such an application, there is a general feeling of well-being and increased vigor. It is this fact which renders the cold morning bath so favorite a measure with those who are acquainted with its benefits.

Under the influence of these cold applications, the "tonus" of the stomach is increased, secretion and excretion are increased, appetite and digestion are improved, the blood is better circulated and the whole body flourishes.

The influence upon the blood of short, cold baths, especially when preceded by a warm bath, was shown many years ago by Winternitz, who demonstrated an increase in the red blood cells amounting to fully one-third, after a short, cold bath preceded by a warm bath.

The increase of white cells was still greater, amounting to 300 per cent. This increase occurs within a half hour after the application of the bath, showing that it is not due to the production of new cells but to the return to the general circulation of blood cells held back in the congested liver, spleen and other viscera.

The importance of such an increase of leucocytes in the circulating blood of the surgical patient cannot be overestimated since it is upon these cellular elements that the body chiefly depends to repair injuries and to combat invading microörganisms.

Henocque and Crawford have shown that under the influence of tonic cold baths, the oxygen-carrying capacity of the blood is greatly increased, and d'Arsonval, with others, has shown that as the result of such applications, the amount of oxygen passed through the body in a given time, is notably increased.

By these means it becomes an easy matter to increase the amount of oxygen supplied to the tissues and without the inhalation of oxygen gas, a method by no means always available. In fact, ordinary air always contains more oxygen than the blood is able to take up, and the advantages derived from the inhalation of pure oxygen are small compared with the aid afforded by an improvement in the absorption and utilization of oxygen.

Cold friction may be applied several times a day and may always be depended upon to increase the oxygen-carrying power of the blood and is a remedy which is always instantly available.

Strasser demonstrated more than twenty years ago that general cold applications increased the alkalinity of the blood, one of the most efficient means by which general vital resistance may be augmented, and the danger of surgical acidosis combated.

Strasser and others have shown the influence of the cold bath in stimulating the general metabolic changes throughout the body, thus promoting repair and hastening convalescence.

Strasser also showed that the improved condition secured through the cold applications reduces the imperfectly oxidized wastes of the body from 8.7 per cent of the total amount excreted to 1.7 per cent, an improvement of more than 500 per cent.

The increased CO_2 elimination following cold applications is substantial evidence of increased oxidization and accelerated metabolism. The change produced in the average invalid by tonic applications of cold water, preceded by short warm applications, such as an electric light bath or some other thermic application, is often very striking, and it is even more evident to the patient himself than to the physician, in increased vigor, endurance and a sense of well-being.

The writer has for many years followed the plan of giving to his surgical patients at least one week of this tonic treatment when possible to do so, and a second or even a third week of treatment may often be given to excellent advantage when no urgency exists.

Before operation the surgical patient should spend every moment possible in the open air, both night and day. The good results of the "fresh air cure" are clearly established by the experience of hundreds of sanatoria for consumptives in which it is the principal therapeutic measure employed, aside from the regulation of the diet.

A countryside hospital well supplied with pure air affords the best opportunity for first-class results. My own operating-room is closed to external air, all the air admitted being purified by thorough washing with a suitable apparatus. Smooth glass walls and porcelain tiled floor are additional measures of safety.

PREPARATORY REGIMEN.

While receiving the benefit of these tonic measures, the patient's diet is carefully looked after. A well trained dietitian prepares the menu for every meal and takes care to see that the daily ration is *carefully* balanced, not only in relation to protein, fats, and carbohydrates, but in relation to food iron, food lime and other organic salts and vitamins.

If the patient's blood is low in hemoglobin, and especially if there is likely to be more or less loss of blood in the prospective operation, effort is made to build the blood up as much as possible by the free use of greens, which are taken in liberal doses at every meal, distaste being prevented by serving a variety of different greens instead of confining the patient to a single kind. Turnip tops, witloof, beet tops, lamb's quarter, red root, narrow-leaved dock and purslane are readily available during the summer, and at other seasons, by the aid of hot houses, a necessary accessory of all large institutions for the care of the sick. Spinach is always obtainable. In extreme cases, transfusion from a suitably selected donor is resorted to.

Changing the Intestinal Flora.—One of the most important things to be done in the preparation of a patient for a severe surgical procedure is to change his intestinal flora. Many years ago, Bouchard called attention to the enormous injury done to the body by the toxins produced through putrefaction of the food residues in the colon. He showed that a carefully filtered infusion of the human feces injected into the veins of a rabbit will produce death in a few minutes. A little later Vital and Roux called attention to the readiness with which the colon bacillus finds entrance into the circulation from the colon and, infecting the tissues, may set up pleurisy, peritonitis, hepatic abscess and other complications which not infrequently occur after severe operations.

Mr. Lawson Tait of Birmingham, England, was one of the first to recognize the relation between colon contents and peritonitis and to make a practical application of the doctrine of Bouchard to abdominal surgery. He recognized the fact that bacteria readily find their way from the intestinal tract to the peritoneal cavity, and to prevent this took great care to thoroughly empty the intestine before operation, and to secure thorough and early evacuation of the bowels after operation.

Acting as a pupil assistant for a few months some thirty years ago (1889) I asked Tait one day what he considered the most efficient means of combating peritonitis following a laparotormy. He instantly replied, in his characteristic manner, "Nothing at all; the patient who has peritonitis after a surgical operation is certain to die. The time to cure peritonitis is before it begins. If the peritoneal cavity is kept well drained, peritonitis will not occur. The important thing is to purge the patient to keep the peritoneal cavity free from stagnant fluids. I am not afraid of germs, they cannot grow without food."

Tait purged the patient vigorously both before and after the operation, and, although he did not wear rubber gloves and was by no means scrupulously cleanly in his methods, he was able to show a record of 116 laparotomies in succession without a single death.

After returning home, within six years, I made several series of abdominal sections, aggregating 440 cases in all, in which by the addition of many of the measures detailed in this paper to the special technic learned from Tait, I was able to secure a great reduction in the mortality rate current in this country at that time. Of these, were a series of 87 cases of ovarian and broad ligament tumors, with one death; 233 cases of non-septic, ovarian cysts, with one death; a series of 165 successive cases of removal of ovarian tumors, diseased ovaries or appendages, without a single death.

The possibility of changing the flora demonstrated by Tissier and Metchnikoff was later brought forward. Although the buttermilk method of Metchnikoff proved to be inefficient and unreliable, the fundamental idea was a good one, and after many unsuccessful efforts, I finally succeeded in developing a simple plan for changing the intestinal flora which has proved itself to be effective and satisfactory in all cases except those in which serious mechanical obstruction of the intestine exists. This plan is simply the employment of a fruit regimen for a few days. This consists of fresh fruit combined with bran or agar, with the addition of milk sugar (nine or ten ounces) and paraffin oil. When the hemoglobin is low, purees of greens are added.

The fruit regimen is especially indicated when the tongue is coated, the breath offensive and stools putrid; in other words, when the patient is toxic. After three or four days of this regimen, the tongue clears and the stools lose their putrid character. They become nearly odorless, or slightly sour in odor. Agar or bran and mineral oil are used in sufficient quantity to induce the bowels to move three or four times a day. If necessary, an enema of three or four pints of warm or tepid water is used twice a day. The colon must be made clean and kept clean. The change of flora is greatly facilitated by adding to the daily enema a few ounces of milk sugar or malt sugar and introducing into the colon after the enema, half a pint of an active whey culture of *b. bulgaricus and b. acidophilus.*

The advantage of getting rid of the load of toxins which the average patient carries is enormous. The intestinal stasis which usually follows a surgical operation, especially in abdominal cases, is sufficient in itself to tax the poison-destroying and eliminating functions of the body to the safety limit, and if this condition supervenes upon an already existing toxemia due to chronic colonic stasis, the dangers incident to operation are enormously increased.

Prophylaxis Against Shock.—For some years evidence has been accumulating that shock is due to an undue accumulation of toxins in the blood and tissues. Twenty-five years ago Lauder Brunton suggested that deaths under anesthesia are not directly due to the anesthetic but to the body toxins His theory was that the anesthetic served only to lessen the resistance of the living cells to the circulating toxins and to cripple the toxin-destroying power of the liver. Cannon and others have recently shown that shock may be the result of absorption from the injured surfaces of substances which produce a profoundly toxic effect upon the nerve centers and the terminal arteries.

It is evident that the freer from toxins the body can be made when an anesthetic is to be given, or a severe operation to be performed, the better the prospect for a safe and successful outcome.

After the flora has been changed by a few days of fruit regimen, a non-toxic dietary should be adhered to before the operation, after the operation, and until convalescence is fully established. This requires a reduction of the protein to as low a level as safety will permit, certainly not exceeding 10 per cent of the total calory value of the ration.

Bouillon and meat extracts of all sorts must be discarded. Sapelier, an eminent French surgeon, asserted many years ago that "Bouillon is a veritable solution of toxins." Meats must necessarily be discarded because of the readiness with which the undigested residues undergo putrefaction in the colon, besides introducing myriads of putrefactive bacteria which are always present in fresh, salted and smoked meats of all kinds.

The famous surgeon, Paget, in his lessons on surgery, many years ago asserted that "The high death rate from operations in cities, as compared with rural districts, is due to the fact that city dwellers eat large quantities of meat, while country dwellers in Europe taste meat only on occasions."

More than a dozen years ago Tissier called attention to the fact that vegetable proteins are only about "half as prone to putrefy as animal proteins," and Torrey has recently demonstrated the same fact. Neither bouillon nor meat broths are ever served to my surgical patients. Tea and coffee as well as wines are also scrupulously excluded from the bill of fare. Dr. Wiley has shown by analysis of coffee as served that a cup of cheap restaurant coffee contains two grains of caffein to the cup, and the coffee served at a first-class hotel twice as much. If caffein is needed, it is administered hypodermatically.

Storing up Glycogen.—It is most desirable that that wonderful poison-destroying organ, the liver, and the poison-eliminating kidneys should be gotten into as fine a condition as possible before the operation, so as to be prepared to deal with the anesthetic, itself an active poison, as well as the great influx of poisons naturally following the operation. For accomplishing this, it is especially important that the patient's diet should be rich in carbohydrates so that the patient's liver, muscles and body cells may be well stocked with glycogen. The detoxicating and poison-destroying functions of the liver have long been known to be associated with its glycogenic function. An ample store of glycogen is necessary to enable the liver to deal successfully with the toxins brought to it through the blood.

To insure that the liver cells shall be well filled with glycogen at the time of the operation, the patient should take at least sixteen ounces of carbohydrates daily, and during two or three days before the operation it is well to administer eight or ten ounces of malt or milk sugar daily in addition to the regular meals, and four to six ounces of malt sugar well diluted with water should be given to the patient the morning of the operation in divided doses.

It is current practice in abdominal cases to give the patient no food on the day of operation. This plan has the disadvantage that it brings the patient to the operating table fasting and necessarily with his store of precious glycogen greatly reduced. Glycogen is necessary not only to support the heart in its activity, but to aid the liver in dealing with the great flood of toxins thrown into the blood by the anesthetic and the traumatism of the operation and which are the principal cause of shock, as shown by Cannon. An abundant store of glycogen in the liver and the body cells is the best possible means of protection against shock. In order to enrich the patient's store of glycogen, I have for years adopted the practice of giving the patient eight or ten ounces of malt sugar between the last meal at night before the operation and the hour of the operation. Four to six ounces of malt sugar dissolved in water may be given in divided doses the morning of the day of the operation.

The value of this ready-to-use nutriment is very great not only as a means of replenishing the liver's store of glycogen, but to sustain the heart which consumes a fraction of a calory of sugar at every beat, and especially to combat the acidosis invariably produced by the anesthetic.

Renal Efficiency.—If a high non-protein nitrogen content is shown by the blood test, or the urinary test ration shows renal inefficiency, the operative hazard may be enormously lessened by a few weeks' careful treatment, with an atoxic diet, changing the flora and improving metabolism and elimination.

Prophylaxis against Acidosis.—If the CO_2 tension is found to be less than 34, which is not infrequently the case in persons whose nutrition has been seriously interfered with by fever, low diet or other cause, the body's store of glycogen must be replenished and CO_2 tension raised to normal by carbohydrate feeding, particularly by the use of malt sugar and milk sugar, of which an ounce may be given in a half glass of water every hour, for a day or two before the operation, or even every half hour if the patient is able to retain fluids. If not, retaining enemas of malt or milk sugar, two ounces to the pint, are given. In extreme cases, intravenous injections of Ringer's solution with the addition of five per cent. of glucose are given.

Mouth Toilet.—Very special attention is given to the toilet of the mouth. The teeth are thoroughly cleansed by a dentist some days before the operation, and are daily polished by the patient or the nurse in attendance, with wood pulp or cloth paper, orange stick and points.

Focal Infections.—Special care is taken to discover and eradicate focal infections in teeth, tonsils, cervix uteri, or elsewhere.

The Colon.—In all cases, but especially in cases in which the abdomen is to opened, particular attention is given to the colon. It is rare to meet a chronic invalid or a surgical case that is not suffering from intestinal stasis. The fact that the bowels move once a day or even more than once a day, is no evidence that the colon is being promptly emptied of food residues and body wastes. X-ray examinations of the colon with the barium meal show that the average colon which is evacuated once a day does not dismiss the last remnant of the opaque meal in less than fifty to fifty-four hours, and a much longer time is often required. This means that the average colon contains constantly the residues of six or seven meals, and is from one to two days behind-hand in the dismissal of its contents. The contents of such a colon are always in an advanced stage of putrefaction, and in consequence, the bacterial flora is not only highly prolific and luxuriant, but very virulent.

Infection of the mucosa is usually shown to be present by the appearance of more or less mucus in the stools. By a few days' proper regimen and treatment, the condition of the colon may be completely changed.

At the outset the motility of the intestines should be determined. This may be done by giving the patient a couple of carmine capsules at breakfast and then noting the time of the appearance of the red color in the stools. The time of disappearance is also noted. The color should appear in ten to fourteen hours and disappear, at the longest, within twenty-six hours. If the motility test and examination of the stools or the *x*-ray examination of the intestinal canal show evidence of stasis or colitis a special course of treatment should be undertaken to get the colon into as healthy a condition as possible before an operation is undertaken. It is most desirable that the patient should have a clean tongue and a sweet breath and non-putrid stools before he lies down upon the operating table.

The fruit regimen for a few days will render the food residues non-putrefactive, and by the use twice daily of cleansing enemata and the introduction into the colon of active cultures of the *bacillus acidophilus* and *b. bifidus* in starch and milk sugar or dextrine solutions, the virulent putrefactive character of the flora will be rapidly changed and in many cases all evidence of colonic infection will disappear.

Improving the Intestinal Motility.—If two carmine capsules are taken at breakfast, an enema taken at bedtime should remove the last trace of red color. At the longest, the carmine should disappear after breakfast the next morning. A sufficient amount of mineral oil and agar or bran should be given to bring about this result. Before operation, the bowels should be made to move, if possible, three times a day, and without the use of laxatives. When this is accomplished, no difficulty will be found in moving the bowels after the operation.

It is important to know the motility time before the operation so as to know when to expect spontaneous movement after the operation.

Preparation of the Bowels.—The preparation of the bowels immediately before the operation is a matter of great importance. Tait's method of purging with saline laxatives before the operation was without doubt the means of saving many lives, but it involved serious inconveniences. Some years ago, Case called attention to the fact that after the administration of laxatives of any sort, the descending colon and often the entire colon is universally found in a highly spastic state. Alvarez has also called attention to the same fact. This condition of the descending colon after the administration of a laxative doubtless accounts, in large part at least, for the great difficulty often encountered in efforts to evacuate the colon after abdominal operations. Tait resorted to the most drastic measures. One of his favorite methods was to administer a tablespoonful of turpentine in a soap enema. These enemas were often many times repeated at intervals of two or three hours and sometimes until the patient was greatly exhausted.

Several years ago, Alvarez and Taylor of the University of California conducted experiments upon rabbits which proved the injurious effects of purgatives and the inadvisability of making use of purgative drugs in preparing a patient for an abdominal operation. These investigators thus described the effects of purgatives as studied in the intestines of rabbits, portions of which were removed and placed in a warm, saline solution, for the purpose of observing the automatic movements of the gut:

"The well purged rabbit is likely to be apathetic and to look sick. Its bowel is full of gas and fluid, and the mesenteric circulation is disturbed. Excised segments beat poorly and irregularly in Locke's solution, and they fatigue quickly. They respond poorly to drugs. Some parts of the bowel are abnormally irritable, while others fail to respond at all to powerful stimuli. This unevenness in the gradient of muscular forces must interfere with the steady progress of food through the gut; and it probably favors the production of colic and gas pains."

The investigators conclude on the basis of their experimentation with animals that it is not wise to purge shortly before an operation in which the bowel must stand drying, handling, cutting, and sewing. The surgeon may well give some heed to this suggestion, at any rate to the extent of carefully weighing the reputed advantages of preoperative purgation against the detriment suggested by these studies.

Castor oil and magnesium sulphate were found by these observers to produce a particularly bad effect upon the intestine.

Gosset and Mestrezat recently reported to the French Society of Biology (*La Presse Médicale*) the results of experiments in which they "studied the effects of purgation with castor oil on the urinary secretion and its possible relation to operative shock. They found that castor oil purgation provokes (1) a pronounced oliguria due to the purgation itself, which, with the restricted diet preparatory to operation, causes a reduction of from 29 to 70 per cent of the total volume of urine (an average of 37 per cent); (2) a notable diminution of the excreted materials (acids, extracts, ash, etc.); (3) an alteration of the composition of the urinary nitrogen, characterized by a diminution of the figure for urea nitrogen with an increase of the non-protein nitrogen. The non-protein nitrogen of the urine of 24 hours presents sometimes, even in spite of oliguria, a figure higher in absolute value than that of the normal urine.

"It is apparent from these facts that the efficiency of the kidney is lessened at a moment when the organism is subjected to the influence of chloroform or ether. It is also to be noted that there occurs during the days following purgation an altogether abnormal increase of the lesser known nitrogenous products which are recognized as a positive factor in shock."

I believe that the use of laxative drugs is highly detrimental. They should be carefully avoided in the preparation of the patient for the operating table, a practice which I have followed for some years, with most satisfactory results.

Case and other *x*-ray experts have shown that the food residues reach the colon on an average within eight hours after the meal is taken, the small intestine being at this time entirely empty. It is evident, then, that cathartics are not necessary for the evacuation of the colon and that they actually hinder the complete evacuation of the colon by causing a spastic contraction of the descending and pelvic colon. A warm enema, followed, if necessary, by a tepid enema, will suffice to empty the colon when mechanical obstruction does not exist. If a plain enema fails to secure complete evacuation of the colon, a half pint of malt extract or molasses or the juice of a lemon or a dram of citric acid may be added to the enema.

Gas in Small Intestine Due to Incompetency of the Ileocecal Valve.—The abdominal surgeon often experiences great inconvenience from the enormous amount of gas found present in the small intestines. Case demonstrated in human beings the retroperistaltic action of the colon, first observed by Cannon in cats, and in 1913 called attention to the fact that after a laxative of any kind the antiperistaltic action of the colon is very greatly exaggerated. This fact explains the presence of gas in the small intestine. The antiperistaltic action of the colon evidently forces the gas back from the colon through an incompetent ileocecal valve into the small intestine, thus preventing the intestine from emptying itself and causing retention in the intestine of semi-liquid feces with gas, and the absorption of toxins.

These difficulties are less likely to appear when laxative drugs are not used in preparing the patient for operation for the reason that laxative drugs of every sort cause spastic contraction of the descending colon and greatly exaggerate antiperistalsis. Since abandoning the use of laxatives before operation some years ago I have found in several hundred cases of abdominal section intestinal gas a serious inconvenience in only a few cases.

The only laxative measures employed in preparation for any operation are paraffin oil and the enema. Double doses of paraffin oil emulsion, an ounce before and after each meal, are given to the patient for two days before the operation. An extra dose is given at bedtime the night before the day of operation.

Paraffin oil empties the colon without producing spastic contraction, and leaves no irritation behind. It acts simply as a lubricant and may well replace castor oil and the saline laxatives of various sorts so commonly employed.

In addition to paraffin oil an enema is administered twice daily and on the morning of the operation. When this measure is employed efficiently, the colon is completely emptied, and the patient goes to the operating table with the intestines in the best possible condition.

WATER STORAGE IN THE TISSUES.

During the days immediately preceding the operation, the patient is required to drink from three to five pints of water daily in addition to the amount taken at meals. This has the effect to clear the body of toxins and to saturate the tissues with water, and increase the blood volume, thus preparing the body to deal with the flood of toxins with which it is deluged by the anesthetic and the unavoidable traumatism necessarily involved besides the intestinal stasis which often follows abdominal section.

Care of the Patient during Operation.—As Crile has so ably shown, the patient's mental state before the operation is a matter of much importance. It is my custom always to see the patient for a moment before the operation to say words of encouragement and, if possible, to send the patient into the operating room with a smile.

In former days, infection was the chief source of anxiety to the surgeon, especially the abdominal surgeon, but this risk has been so nearly eliminated by the perfection of operative technic that shock and pneumonia are now the chief sources of anxiety. Pneumonia and shock are much more easily prevented than cured. It is important to make sure before operation that the patient is not a pneumonia carrier by a careful examination of the secretions of the upper air passages.

It has been the writer's practice for twenty years or more, to begin treating every patient for pneumonia at the same moment that the administration of the anesthetic is begun. The great value of hydriatic applications to the chest and the hot pack to the body, in general, in the treatment of pneumonia has been well established. The value of these measures was well shown in the great epidemic of influenza of 1918 in a community adjacent to a large cantonment. Among 200 cases of influenza, many of them complicated with pneumonia, only two deaths occurred, a mortality of 1 per cent. In a series of more than 200 cases of lobar pneumonia treated by the hydriatic method, the mortality was less than 6 per cent.

As soon as the anesthetic is begun, a cold compress is applied to the chest. This is changed every five minutes during the operation. The nurse who assists the anesthetist attends to the compress and takes care to rub the chest vigorously with a dry flannel cloth each time the compress is changed. The effect of this cold compress is to prevent the stasis in the lung circulation which naturally follows from the anesthetic, as shown in the darkening of the venous blood, blueness of the lips and the cyanotic appearance of the face. Pneumonia and dangerous heart weakness are very likely to follow an operation when very pronounced cyanosis occurs.

Cold applications to the chest are wonderfully effective in preventing pulmonary stasis. This remedy is so simple and practicable that it can be employed in practically all cases and under all circumstances when an anesthetic is given.

Nitrous oxid anesthesia is much less likely to be followed by pneumonia than is ether; nevertheless, the chest compress is again important for the reason that it very considerably lessens the amount of gas required. This is due to the fact that cold applications to the chest produce a notable effect upon the respiratory movements causing much deeper respiration, and so increasing the volume of the tidal air. Actual experiment shows that the tidal air is nearly doubled under the influence of the cold chest compress applied in the manner above directed.

By cold applications to the chest, renewed every five minutes during the operation, the amount of gas required and hence the danger from the anesthetic are very greatly lessened. The reason for this may be clearly seen by a moment's consideration. The intensity of the anesthesia depends, of course, upon the amount of nitrous oxid taken up by the blood. The amount absorbed depends upon the volume of gas taken into the lungs rather than upon the percentage of the gas. For example, suppose a patient to be receiving a mixture consisting of 85 per cent. nitrous oxid and 15 per cent. oxygen. With this percentage, the cheeks remain pink and the patient goes on admirably; but if the breathing becomes shallow, the amount of gas absorbed may not be sufficient to produce as profound anesthesia as is necessary. By lessening the per cent. of oxygen and increasing the proportion of nitrous oxid to 90 or 95 per cent, more gas is taken into the lungs and profound anesthesia may be produced, but the patient is likely to become cyanotic.

But the result desired may be attained without the undesirable cyanosis and without increasing the percentage of gas and so diminishing the intake of oxygen. All that is needed is that the patient shall breathe deeper. By cold applications, the patient may be easily made to double the amount of the gas mixture inhaled, and thus increase the amount of nitrous oxid taken in without increasing the percentage; and so, while more nitrous oxid is being received and absorbed, more oxygen will be taken in and absorbed also. By this means, profound anesthesia may be induced without producing cyanosis which is always to be assiduously avoided. The use of the chest compress in the manner suggested is thus, I find, a most effective safeguard against the chief danger from nitrous oxid anesthesia.

Every possible means is employed to lessen traumatism. The incision is no larger than necessary. This saves time as well as traumatism. The edges of the wounds are protected from bruising. Pointed instead of broad forceps are used for picking up arteries, and the arteries are tied at once instead of leaving the forceps long in place. Intestines and other parts are manipulated as little as possible. Special care is taken to avoid abrading or bruising the peritoneal surfaces. Instead of cheese cloth napkins, padded napkins covered with Chinese silk and oiled with paraffin, are used for walling off the intestines. These silk-covered napkins have the advantage that they do not adhere to the intestines and cause superficial traumatisms, as do cotton napkins, and, when drawn out of the abdomen, they do not drag the intestines after them as do ordinary napkins. By applying all these means, the danger of adhesions is greatly lessened.

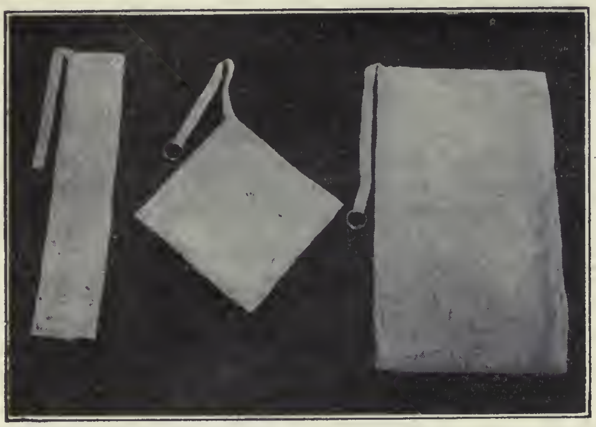

Fig. 1. Silk pads for use in laparatomies.

Fig. 2. Photophore.

Small catgut is used in closing the wound, and no more is introduced than is required for safety.

The Blood-Pressure During the Operation.—A measure of safety that I consider of great importance, and that I have uniformly employed for many years, is taking the patient's blood-pressure every five minutes during the operation. The pressure is taken just before the operation and the results are announced to the surgeon, and also when any marked change occurs during the operation. Each reading is recorded, as soon as taken, in large figures on a placard placed so to be easily seen by the surgeon. A trained assistant or the anesthetist holds a finger upon the pulse continually, during the entire operation. The cuff of the blood-pressure instrument is kept constantly upon the arm, being loosened after each reading of the instrument. It is important that the diastolic as well as the systolic pressure should be noted. The diastolic pressure is in fact a better indicator of the condition of the bloodvessels than the systolic.

If there is any considerable drop in the pressure, Ringer's solution is introduced by infusion or intravenously in sufficient quantity to bring the pressure back to normal. It is much easier to combat incipient shock than to deal with this condition when fully developed, hence it is important to recognize the earliest symptoms of beginning shock which can be done only by closely watching the blood pressure during the operative procedure. A considerable fall of pressure is an indication for the transfusion of blood from a suitable donor. It is well on this account to determine the classification of the blood of the patient before the operation. It is the writer's practice to keep a list of thirty or forty classified donors in readiness.

Celerity in Operation.—Another matter of importance is the time occupied with the operation. When the patient is brought to the operating room, the operation should begin at once, as the patient is in a state of suspense and tension, and hence losing energy at a rapid rate. Long waiting in a state of suspense may exhaust the patient as much as the operation itself. The normal energy expenditure through tension is 30 to 50 per cent. of the basal metabolism. This rate may be increased several times by nervousness, fear, or suspense, thus causing rapid loss of energy which in the case of a feeble patient may be a factor of grave importance.

After the operation is begun, not a moment should be wasted in doing things which could have been done before. Every moment is precious. Celerity in operation, not through undue haste, but by the aid of quick methods and manual dexterity, supported by well-trained and attentive assistants, good instruments, a good light, and the elimination of all distracting elements so that the attention and energy of the surgeon and all his assistants may be concentrated upon the work in hand, is certainly a matter of no small advantage to the patient, since it secures to him the least possible handling of the tissues, the shortest possible exposure, and the smallest possible amount of anesthetic—all considerations of great importance. I find that patients in whom the operation is completed in the shortest time, other things being equal, make the most rapid convalescence. I do not pride myself on being a rapid operator and should be ashamed to be known as a hasty operator; but I aim to reduce the time of my operations to the smallest number of minutes and seconds consistent with complete, thorough, and neat work. Everything that needs to be done must be done, and must be done well; but fussiness, hesitancy, and loss of time from any avoidable cause lessen chances of prompt recovery.

A patient who is kept upon the operating table two hours or more for an abdominal operation which a manually dexterous surgeon usually completes in twenty to forty minutes has greatly increased chances of suffering from shock or collapse, pneumonia, peritonitis, adhesions and other complications and greatly lessened chances of recovery and quick convalescence. A well executed operation is best done when quickly done.

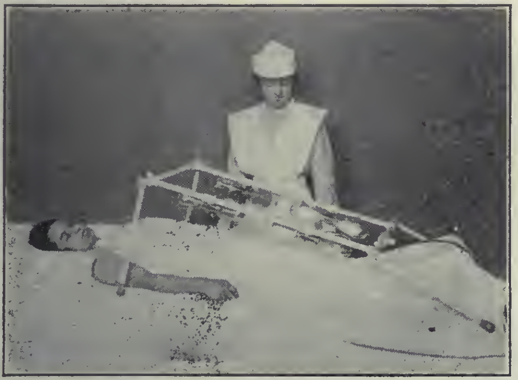

Fig. 3. Applying the Electric Lamp Radiator.

The thorough rehearsal of nurses and assistants who are to take part in an operation is a most valuable aid in expediting operative work. Movies of abdominal and other operations are also freely used as a means of making operating room nurses thoroughly familiar with the technic.

POST-OPERATIVE CARE.

The post-operative care of the patient is greatly simplified by the proper pre-operative preparation. To combat shock, collapse and pain, are the immediate requirements; to prevent pneumonia, peritonitis, adhesions, wound infection and other complications are also matters of importance. Rational and physiologic means prove wonderfully effectual in meeting all these indications.

The crowning achievement of scientific medicine is prophylaxis, and there is no branch of medicine in which preventive medicine may be more successfully and more appropriately employed than in surgery. This is especially true with reference to shock.

Prevention of Shock.—The measures which I rely upon for the prevention of shock are the following:

(1) Saturation of the patient's tissues with water by copious drinking, and, if necessary, the use of retaining enemas for a few days prior to the operation and the morning of the operation.

(2) The employment of nitrous oxid and oxygen as an anesthetic instead of ether or chloroform, a practice which I have followed for the last sixteen or seventeen years, during most which time ether has been rarely used and chloroform almost never.

(3) Small wounds, delicate handling of the tissues and as great celerity as possible in operation.

(4) Careful watching of the blood pressure, systolic and diastolic, during the entire operation. Infusion of Ringer's solution if needed and transfusion when necessary.

(5) After the operation, heat is applied to the hips and legs. and the skin is vigorously rubbed with mitts or towels wrung out of cold water.

(6) In some cases, marked benefits seem to be derived from introducing into the colon two or three pints of water at a temperature of 80° F.

In case of collapse from weakness, loss of blood or from heart failure due to myocarditis or other cause, the same measures are used as for shock, and, in addition, intravenous injection of Ringer's solution or transfusion of blood. Special care is taken to avoid permitting the patient to become cyanotic. The application of cold compresses to the chest, renewed every five minutes, as already explained, is one of the most efficient means of preventing cyanosis and collapse.

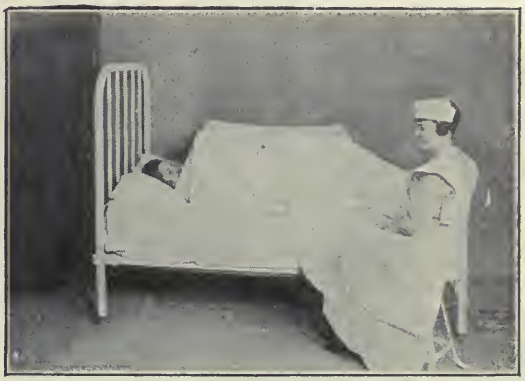

Fig. 4. Electric Lamp Radiator in Place and Covered.

As soon as the patient arrives at his room, he is placed at once in a warm pack which should extend from the feet to the hips or even to the shoulders. Hot applications may be made either with a blanket wrung out of hot water, a large fomentation applied to each leg and the back and hips separately, or the electric thermophore blanket. The last-named appliance is exceedingly convenient and has been in daily use in my wards for many years. The radiator, or other means by which the heat of incandescent lamps may be utilized, is also a good heating measure. Care should be taken to avoid over-heating. As soon as the skin is well warmed, a cold towel rub or mitten friction is applied to the entire surface of the body not covered by the dressing. Cold friction not only energizes the heart and thus raises the blood pressure but stimulates the peripheral bloodvessels, thus directly combating shock.

I have made use of these hydriatic measures for more than thirty years and with most excellent results. I am glad to note that the rationale of the effects produced is quite in harmony with the theory of shock brought forward by Cannon, and others, as the result of their studies of this condition at the front, in France. If it is true that the immediate cause of shock is paralysis of the small bloodvessels, which permits an undue accumulation of blood in the arterioles and capillaries, as the result of the influence of toxins thrown into the circulation from the wound, it is evident that short applications to the skin of heat followed by cold rubbing, must be a most efficient means of combating this most serious of surgical complications.

Non-Drug Measures for Relief of Post-Operative Pain.—The pain following operation may, in most cases, be easily relieved by the administration of some preparation of opium, either by itself or in combination with atropia. But, unfortunately, the effects of the free use of these drugs is in a large class of cases, especially operations involving the abdominal cavity, most pernicious. Lawson Tait was the first to call attention to this fact. Prior to his work, it was the universal custom to administer opium in liberal doses after abdominal operations. The bowels were often tied up for a week or more. In those days, it was customary with many surgeons to put in mattress sutures of thick silk to prevent the patient from bursting open, as the result of the enormous tympanites which sometimes developed.

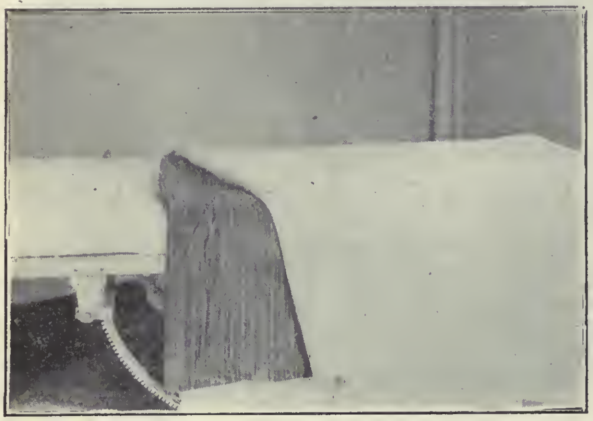

Fig. 5. Electric thermophore blanket.

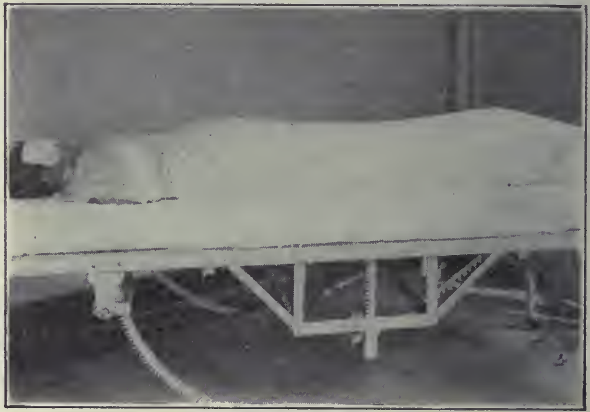

Fig. 6. Hot pack with thermophore blanket after operation to combat shock and pain.

Tait refused to give anodynes of any sort. He laid very great stress upon this point and believed his phenomenal success to be largely due to the avoidance of narcotic drugs. When questioned on the subject, he told me that he never gave an anodyne of any kind unless he was convinced that the patient was going to die. When I asked "What do you do when the patient suffers so greatly as to disturb other patients by groans and screams?" which one often heard in his wards, he said, "I tell the patient to shut up, that such noise is not permitted."

"But suppose the patient does not shut up. What then?" "I discharge the nurse," was Tait's reply, and that he did. The nurse was made to understand that it was her duty to keep the patient quiet, but no means were placed in her hands for accomplishing this except the rude word of command, "Shut up."

It occurred to me that the resources of hydrotherapy, such as the hot foot-bath, the hot hip and leg pack, fomentations and other measures might prove as efficient in relieving the pelvic pain following an operation as in relieving the pain of dysmenorrhea or of cystitis or colic. I had often succeeded in relieving such pains and even severe neuralgia of the face and toothache, by heat applied to the lower extremities. On trial I was delighted to find these measures wonderfully helpful when employed with surgical cases, and within a few months worked out a routine which I have followed with little variation for more than thirty years.

Of more than 12,000 patients operated upon by myself, only a small percentage have been given morphia or strong narcotics of any sort, yet they have been made so comfortable that they were able to sleep at night, and rarely asked for an anodyne. An anodyne is, of course, never refused in any case in which the patient really suffers severely and is not substantially relieved by the treatment given, but this seldom occurs. Anodynes increase the difficulty of moving the bowels early, the importance of which cannot be overestimated, especially in abdominal cases. When the effect of the anodyne is gone, the patient usually suffers more than before and often a drug habit is formed.

In a large hospital which I visited, where morphia is used as a routine after all abdominal operations during the first two days, a nurse said to me, "We have an awful fight the third night when the drug is withdrawn." An "awful fight" on account of pain is a very rare occurrence in my experience. After the first few hours the patient suffers little.

The application of heat over the wound by means of the photophore or the radiator and to the lower extremities immediately following the operation, even before the patient is fully out from under the anesthetic, prevents the development of the nervous state in which slight pains are so exaggerated, making the patient restless and irritable.

The hot blanket applied immediately after the operation not only combats shock and collapse but also relieves pain to such a degree that the patient often sleeps during the application, and usually gets several hours' sleep during the first night without the use of drugs. If anything is needed, it will be nothing more than one or two doses of 1/24 or 1/12 grain of heroin, or a single grain of codein.

Sandbags to prop the patient up on all sides so as to relieve tension are of great service. The sand bags may be heated if the effect of heat is needed.

Keeping the bowels empty by means of warm enemas will often obviate the use of an opiate by preventing gas pains. Gas pains are greatly lessened by avoidance of the use of laxative drugs before the operation.

Adhesions After Abdominal Operations.—The use of the Chinese silk napkins greatly lessens the tendency to adhesions by preventing the abrasion of peritoneal surfaces which results from rough handling, especially in the use of the ordinary cheese cloth napkin.

Post-Operative Colon Stasis.—Colon stasis, due to a spastic condition of the descending colon or any other cause, often becomes exceedingly troublesome, and leads to disaster especially in cases of abdominal surgery. The presence of fermentable residues in the colon leads to gas formation, often with enormous distension, given rise to gas pains which greatly disturb the patient, preventing rest, and thus tending to produce exhaustion.

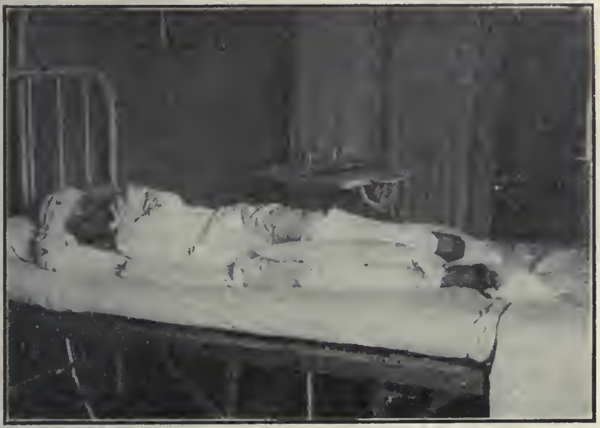

Fig. 7. Use of cushions and sand bags to relieve tension.

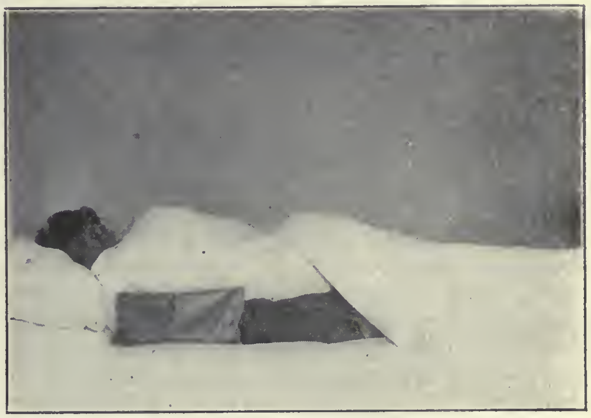

Fig. 8. Sand bags applied to back.

This condition may be combated by putting the patient under treatment for regulation of the colon activity some days or weeks in advance of the operation. Cathartics must be avoided and the colon should be evacuated with water at a temperature of 102°-105° F., one of the best means of combating the gas pains following a laparotomy.

The ordinary hospital regime, especially in abdominal cases tends to produce post-operative constipation. Before operation, the patient is purged, and his intake of food greatly reduced. He is usually instructed to avoid coarse vegetables. The day before operation, the patient takes extra oil and salts of some sort to prepare him for the operation. The effect of this is contraction of the descending and pelvic colon, a spastic condition which renders evacuation of the bowels almost impossible. Gas accumulates in the cecum and small intestines, ascending and transverse colon, and the patient suffers fully through inability to get rid of the gas. Constipation is increased by the use of morphia taken before and after the operation. The diet is usually of a constipating character, consisting of bland gruels, etc., so-called "light diet." All these bland foods are constipating unless supplemented with paraffin oil and bran, which may be taken in very moderate doses at first, and gradually increased later.

For more than twenty-five years, it has been my practice to administer within an hour or two after the operation a copious enema, two or three pints, for the purpose of promoting peristalsis. To render the enema most effective, the temperature should be 85° to 90° F. rather than higher.

My original purpose in adopting this measure was to induce the passage of a peristaltic wave the whole length of the intestine, and by this means to straighten out kinks or folds in the intestine, and to place each convolution in its own particular place. The enema also combats shock.

I endeavor to increase the efficiency of the enema by adding malt sugar or milk sugar in the proportion of about 10 per cent. Molasses or corn syrup may be used instead but is less efficient. In recent years, I have appreciated the additional advantage from the sugar solution used in this fashion from the fact that sugar is the most efficient of all means for combating acidosis, a condition which is always present after profound general anesthesia, no matter what anesthetic is employed.

It seems to me quite probable that the crippled condition of the liver and other organs associated with the intimate metabolic processes of the body, particularly the thyroid and the adrenals, may be an important factor in shock. Certainly, I have seen most excellent results from the use of the sugar water enema employed in this way, and should not be willing to dispense with it as a part of my hospital routine.

The sugar water enema (an ounce and a half to the pint) is repeated in smaller, frequent doses for several days, usually a pint every three hours, the patient being allowed to retain as much as he will.

Another beneficial effect of the sugar water is to prevent putrefaction in the colon and thus prevent the toxemia which rapidly develops when intestinal stasis occurs in a depressed or feeble patient, still further crippling the liver and kidneys which have had to perform the great task of dealing with the anesthetic.

Post-Operative Testing of the Intestinal Motility.—The first night after the operation, the patient is given a carmine capsule, and a little later, a dose of mineral oil. The purpose of these is to act as indicators of the intestinal motility. When the carmine and oil appear in quantity one knows there can be no serious obstruction. The appearance of the carmine at the end of forty-eight hours, or even later, is an almost equally good omen, though it is, of course, possible for obstructions to develop at a later period. On this account, it is necessary to apply the test again after two or three days. It is, in fact, well to repeat the carmine test at intervals of two or three days while the patient is convalescing, so as to have a constant and intimate knowledge of the behavior of the alimentary tract. It is to be noted that traces of carmine may appear when partial obstruction exists.

If the patient suffers from vomiting on the third day following the operation, and if the carmine or oil has not made its appearance in quantity, an *x*-ray examination is made. Some years ago (1915), my colleague, Dr. Case, published the interesting observation that the outline of the distended gas-filled intestines which co-exist with obstruction, may be recognized by the *x*-ray without the necessity of administering barium. It is, fortunately, possible by this means to discover the presence of obstruction, and even to determine the probable location long before any other positive indications of obstruction are obtainable. As every surgeon knows, success in the treatment of obstruction depends upon its early recognition and prompt action.

POST-OPERATIVE FEEDING.

The post-operative feeding of surgical cases is a matter which has received far less attention than its importance demands. In many cases, the patients's nutrition has been seriously interfered with for some time before the operation by the conditions which make the operation necessary. In my opinion, the starvation of patients, either before or after operation, is not only unnecessary but is highly prejudicial to the patient's interests, lessening the chance of recovery and increasing the danger of serious complications. Food is a most important regulator of metabolism. Assimilated food furnishes the material upon which the cell works, both in the performance of its functions and in the repair of its own structure. If material is not supplied in the form of food, the body must draw upon its tissues.

Food, likewise, is the only source of energy for the body. The heart alone consumes approximately two ounces of sugar every twenty-four hours in doing its work in the circulation of the blood.

Furthermore, food furnishes a physiological stimulus to the living cells. The rapid loss of strength and endurance as the result of fasting, and the marvelously rapid restoration of energy by appropriate nourishment, afford ample evidence of the helpful stimulus which may be secured through proper feeding. This stimulation is doubtless due in large measure to the presence of vitamins which abound in certain foods and in which vegetable broths are rich. These vegetable broths differ from bouillon and animal broths in the fact that, while rich in vitamins, they contain no urea and other waste matters of which animal broths are largely made up while containing vitamins in small amount only.

The eating habits of most patients lead to an accumulation of protein wastes in the tissues. Since all excess of protein must be eliminated as urea and other nitrogenous wastes, both the liver and kidneys are overtaxed by this excess protein metabolism causing a predisposition to acidosis and uremia. In addition to these waste products from excessive protein metabolism, the blood and other body fluids are likely to be saturated with toxins of bacterial origin derived from the colon. On this account it is most unwise to feed a prospective surgical patient large quantities of meats of various sorts as a means of preparing him for the operation, or to advise such a diet for promoting convalescence after operation. On the other hand, a low protein diet for a few days before the operation and immediately following the operation, is most advantageous. The blood may be more rapidly built up by a lactocereal diet, with the addition of liberal quantities of greens than by heavy meat feeding.

There is usually a sufficient amount of fats stored up in the tissues to supply the needs of the body for a few days, and the fat intake in post-operative cases may be advantageously diminished because of the inhibitory effect of the operation upon the secretion of gastric juice, which is important in gastric cases especially in preventing the putrefaction of stagnant gastric fluids and so maintaining conditions favorable to healing. It is well to remember, also, that the body is able to manufacture fat from carbohydrates and that starch and sugar are, under normal conditions, the chief sources of body fat.

Abundant carbohydrate feeding is a matter of chief interest in relation to surgical cases. Farinaceous foods of all sorts, fruit juices and malt or milk sugar are the most appropriate materials for feeding a patient on the days before operation and two to five days succeeding.

The feeding should begin early—as soon as vomiting is controlled, for several reasons: The sooner feeding can be begun, the less will be the danger of exhaustion, since the food supply, rather than the tissues of the patient, will thus be the source of energy.

Another benefit to be derived from early feeding, which is especially noticeable in operations upon the stomach and gallbladder, is the suppression of "hunger pains" which Carlson has shown to be due to violent contractions of the stomach. Bland food introduced into the stomach is often more effective than morphia or any other anodyne in controlling the pain following operations on the gallbladder or the stomach.

It is well to remember, also, that food is a natural laxative. Taking food into the stomach sets up peristaltic waves which travel over the entire intestinal tract, thus encouraging evacuation and the elimination of waste matters from the colon.

This early peristalsis has the effect to straighten out kinks in the intestine and to break up newly-formed adhesions which have not yet become organized. It is even advantageous in many cases to make use of moderate quantities of agar or gruels containing bran. By supplying stimulants in these forms, the early restoration of normal bowel action may be greatly encouraged.

I am not able to see any advantage in withholding food altogether during the first days following an operation upon the stomach. Rice gruel or malt sugar solution, sometimes even orange juice, may be taken with advantage.

I find careful early feeding is especially advantageous in cases of gastric surgery, as in gastrojejunostomy, pylorectomy and the Polya operations, as well as in other cases.

The objection that foods may be irritating does not hold good for the reason that bland foods of the sort mentioned must be far less irritating than the acrid matters invariably present. Such foods certainly will be as well tolerated by the stomach as the stagnant, germ-infected, often foul-smelling and irritating material usually found in the stomach after operation. The effect of taking food in such cases is to dilute or wash away the stagnant fluids resulting from oozing, involuntary swallowing of the saliva, etc. Displacing the putrefying gastric contents by a small quantity of bland and sterile rice gruel, often produces a most favorable effect, relieving nausea, hunger pains and other distressing symptoms.

The fact that taking fluid into the stomach may give rise to gastric secretion cannot be regarded as an objection to early feeding for the reason that the gastric juice is the normal disinfectant of the stomach, and its presence will help to suppress putrefactive changes in the gastric fluids, and will hence promote the healing process rather than to prevent it.

When the patient does not vomit, malt sugar water containing two ounces of malt sugar to the pint or fruit juice of some sort containing the same proportion of sugar, is given in spoonful doses hourly, and affords the patient exactly the right kind of nourishment required. Pathogenic organisms do not grow in sugar water, fruit juice or gruel, while they thrive in blood serum, bouillon and broths.

Of course, it is important to avoid overfeeding. A half ounce of rice gruel every two hours while the patient is awake, the first day, increased by half an ounce on the second day, is none too much food for the average patient. After the first few days, spinach puree may be added to promote blood building and thorough evacuation of the colon.

Bouillon, beef juice, broths and similar preparations are carefully avoided, and, in fact, are never admitted to my ward. Vegetable broths, which are quite as appetizing as any of the preparations mentioned and wholly free from unwholesome properties, are freely used. A bouillon prepared from yeast extract so closely resembles bouillon, or extract of beef that it is readily accepted in place of it, and is, in fact, found more palatable, besides, this yeast extract (known commercially as "Marmite," "Savora," and by many other names) is richer in vitamins and in iron than any other food substance.

Gruel diet is relied upon only for a very short time, a few days at the most. Simple purees of vegetables and fruits are allowed after the first two or three days, and these are accompanied by agar jellies and agar in substance or special bran preparations to encourage bowel action. Purees of spinach or other greens are daily on the menu in some form. These lime and iron containing foods are essential to rapid blood building and tissue repair and help to sustain the heart in its arduous work. Green foods are also rich in the vitamins which are as essential for the rapid repair and rebuilding of the tissues as for the normal growth of young animals.

Every meal is carefully balanced not only for proteins, fats and carbohydrates, but for cellulose, food lime and iron and other salts and vitamins. The ordinary hospital diet is woefully deficient not only in lime, iron and vitamins but in cellulose, the natural laxative element of the food.

Acidosis.—Metabolism tests for acidosis, through determination of the CO_2 tension of the residual air of the lungs are always made before operation and daily for several days following the operation and until the metabolism becomes normal. These tests are of value in all cases, and are indispensable in operating upon persons suffering from diabetes.

The reduction of protein and fats to a low level just before and immediately following the operation, while supplying carbohydrates in abundance, is a very efficient means of greatly reducing the dangers of acidosis.

Free feeding of carbohydrates following the operation causes a speedy disappearance of acidosis, as shown by the rapid rise of the CO_2 tension of the residual air.

For Nausea and Vomiting.—Nausea and vomiting increase the tendency to acidosis by interfering with the patient's nutrition, and hence are decidedly more than an inconvenience. After ether anesthesia, washing the stomach out removes the poisons which accumulate in the stomach. The application of the moist girdle, with a hot bag over the stomach, is a very effective means of controlling post-operative nausea and vomiting. This simple but effective measure acts by lowering the tonus of the gastric musculature and thus checking the violent gastric contractions to which Carlson has shown nausea to be in most cases due. Other well-known measures are of course employed when indicated. Turning the patient on the left side often prevents nausea and vomiting by relieving the strain upon the cardiac orifice.

TO INCREASE VITAL RESISTANCE FOLLOWING OPERATION.

The warm packs followed by cold rubbing wonderfully increases the patient's resistance, while at the same time relieving pain, nervousness and other discomforts.

A repetition of the applications two or three times a day serves to double the number of leucocytes in the circulation of the blood, and thus increases the patient's defensive power and his ability to cope with pathogenic bacteria, combats infection, and encourages repair of the operation wound

These applications are given not only immediately following the operation, but daily until convalescence is well established.

Wound Infection.—Infection of wounds may be due to low resistance on the part of the tissues as well as to the introduction of pus-forming germs. As a matter of fact, it is practically impossible to prevent more or less contamination of surgical wounds by air germs, some of which are capable of producing serious disease; hence the resistance of the patient's tissues is after all the dominating factor in the prevention of wound sepsis.

It is often vitally important that the tissues should be re-enforced by the application of heat to the wound. The arc light is, perhaps, the most efficient method for accomplishing this. The incandescent lamp and other sources of heat are also found beneficial.

The time required for the patient to recover from a severe surgical operation depends very largely upon the precautions taken to prevent shock, collapse and other complications tending to lower the patient's vitalitv and to develop complications. When the general program suggested is faithfully carried out, convalescence is usually rapid. After severe operations, my patients are often sitting up within forty-eight hours. On the third or fourth day they are permitted to take an airing in a wheelchair, and a few days later are permitted to get upon their feet, care being taken, of course, to prevent strain or violent exertion.

THE POST-OPERATIVE WATER RATION.

An abundant supply of water is essential after every serious operation to carry off the shock toxins, replace lost fluids and to promote heart action. A half pint of water every hour is the usual program; by mouth if there is no vomiting, by both mouth and rectum if there is nausea and vomiting. The quantity of urine is the best check upon the faithfulness and efficiency of the nurse in getting the patient to take and retain the three or four quarts of water daily required.

FRESH-AIR SLEEPING.

As soon as possible after operation the patient is given the benefit of fresh air day and night. Large open and glass enclosed porches connected with the wards on each floor afford opportunity for airing in all seasons and all weathers. Within two or at most three days after the operation the patient is gotten out into the fresh air and spends as little time as possible in his room. At night, outside windows are opened wide, the patient being carefully protected from chilling draughts.

The invigorating effects of these airings is most marked. Sleep, appetite, healing and convalescence are all greatly encouraged.

Sunbaths are secured whenever possible.

The arc light is made use of as an invigorating measure in appropriate cases and greatly enhances the healing process.

EXERCISE FOR SURGICAL PATIENTS.

Very likely the idea of exercise for surgical cases will at first blush appear quite impractical and inappropriate. So I hasten to explain that by exercise is not meant a morning walk or a visit to the gymnasium, but such simple "bed exercises" as deep breathing, and flexing of the fingers and toes. These begin on the second day. Even the first day the patient is encouraged to take a few deep breaths every hour to combat pulmonary stasis and to encourage the splanchnic circulation. These breathing movements aid the absorption of liquids from the intestine and the movement of the food residues along the colon. They also tend to combat hypostatic pneumonia and bronchitis.

From day to day the exercises are increased so as finally to include arm and leg flexing, arms raising, legs raising, turning in bed, and a considerable variety of movements of the extremities.

The purpose of these exercises is to combat the ill effects of bed confinement, the weakening of the heart, loss of vascular tonus, weakness of the muscles, increase of intestinal stasis and general loss of bodily muscular power and control which inevitably result from a long idleness in bed.

An elevation of temperature, pain on movement, and various other special conditions may of course contraindicate exercise of any sort, and demand absolute rest; but most surgical patients, even abdominal cases, are greatly benefited by exercise of the muscles judiciously administered, and especially by deep breathing exercises. The benefits are shown in early convalescence, a sense of strength and security which enables the patient to rise from his bed in about half the usual time required in bed and to find himself steady on his feet on rising from his bed, even after several weeks' confinement.

When the patient is necessarily confined to bed for a long time, automatic exercises are administered when possible so as to prevent the inevitable degeneracy which results from long confinement. This is given by a special device which brings into action all the larger groups of muscles of the body by electrical stimulation and without any effort by the patient. The muscles are weighted and thus made to do more or less work as indicated in the individual case.

It will be evident from the foregoing that a surgeon who undertakes to avoid opiates as much as possible in the post-operative care of his patients and to surround them with every measure of comfort and safety must require of his nurses a much broader knowledge, more training in physiotherapy and reconstructive measures, and a much higher degree of efficiency than the ordinary surgical nurse possesses. Unfortunately, the ordinary hospital course of training does not at the present time give the amount of time and attention to physiologic measures of treatment necessary to afford a nurse the practical training essential to proficiency in the dietetic and hydriatic management of patients. It is to be hoped that a change in this regard may take place within the next few years. Certainly such a change would greatly contribute to the comfort of surgical patients and to the lowering of the death rate in surgical practice.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

New York, October, 1920.

PRE- AND POST-OPERATIVE MANAGEMENT.

In the successful conduct of a surgical case the preparation for, and, especially, the treatment after, operation are of importance ranking close to that of the operation itself. Surgeons visiting from one hospital to another are, or should be, interested as much in the methods pursued during the post-operative period as in the operations. There is as much for such visitors to observe in the wards as in the surgical amphitheater. Although pre- and post-operative methods tend to a standardization, to a routine, in each institution, they probably vary more from one hospital to another, than do the methods in the operating room.

In the past fifteen or twenty years preparation for operation and routine after-treatment have undergone much simplification. It might be said that that patient is best treated after operation who is treated least. This does not mean, of course, neglect of the patient; it does mean avoidance of the infliction upon him of those bowel-tormenting and other measures which we used to think essential to his recovery.

No longer are patients submitted to much fasting and vigorous purgation before operation. We have learned that these are both bad. Eating and, especially, drinking may be and, indeed, should be continued, in most cases, up to within a few hours of the operation. A simple enema is usually sufficient preparation of the bowels or, at most, a mild laxative also. It is usually only in cases of operation upon the lower bowel or upon individuals who have been greatly constipated that purging before operation is indicated.

The one-time preparatory vigorous scrubbing of the "field of operation," the preliminary application thereto of an uncomfortable and often irritating antiseptic dressing, and the time-consuming re-scrubbing and disinfecting of the skin on the operating table, have all been replaced, in the work of progressive surgeons, by simple shaving and cleansing of the skin before the operation and the application thereto, on the table, of 3½% tincture of iodine or of 5% alcoholic solution of picric acid—preferably after drying the surface with benzine, ether or both.

No longer do most surgeons soon after a laparotomy bombard the patients bowels with calomel, salts and other purgatives; and eserine, which some few years ago held for a time a prominent place as a means of preventing post-operative distention, has gone into the discard because its administration is usually as unnecessary as it is painful. If the intestines are not irritated by purgation before, or undue handling during, operation they usually give but little trouble afterwards. When one is in bed and on scant diet, his bowels may be allowed to go unevacuated for three or more days after an operation; and usually the resumption of these evacuations can be inaugurated with least distress by an enema. A satisfactory routine after a laparatomy (e. g. cholecystectomy, appendicectomy, hernioplasty) is to give fluid diet for two days following that of the operation, administer an enema the morning of the third day and give "light diet" after the bowels are thus moved; thereafter enemata or laxatives are ordered only as needed.

To be sure, the simplified pre- and post-operative routine is only a routine. There are many cases in which, because of the nature of the operation to be performed or a toxic or debilitated state of the patient, much more active preparation should be undertaken, if time permits. In the after-treatment, too, just as the bowels should need little interference in most cases, so, by contrast, there are other cases where moderate gas distention or actual intestinal paralysis call insistently for very active treatment to relieve great distress or even to save life.

Special types of operation, too,—cerebral, thoracic, gastric, intestinal, rectal, vesical, vaginal—require modifications of the after-treatment. It is the comparative study of the routines adopted for these special operations, of the methods of treating or preventing various post-operative complications, that is interesting to the visitor from one hospital to another.

The methods evolved for the preparation for, and treatment after, operation at the Battle Creek Sanitarium are, by comparison with those at many other institutions, quite elaborate.

In presenting them in detail in this issue we are, so to speak, bringing this clinic to those of our readers who have not visited it. They will find of great interest, especially, the dietetic and hydrotherapeutic measures that have been evolved by Dr. Kellogg and his collaborators. They represent a set of efforts to put each patient into optimum condition for operation, and to minimize his hazard after operation. If much of this routine may appear unnecessary for the average, "healthy" patient, at least it will suggest to the thoughtful surgeon a great deal that will be helpful in the management, before, during or after operation of other patients. That surgeon must be self-satisfied, indeed, who cannot find some useful procedure in the after-care methods of others! To seek such improvement in his own procedures as will increase the safety and the comfort, and accelerate the complete restoration, of his patient after operation, should be the constant aim of the surgeon. While after-care is not as often discussed as the pathology or mechanical treatment of surgical diseases, the subject is by no means neglected in our literature. In addition to current articles, like that of Kellogg in this issue of the Journal, one may find a great deal of useful information in such manuals as that of Crandon and Ehrenfried on "Surgical After-Treatment" (W. B. Saunders Co.), or the recently published two-volume work of Willard Bartlett.*

***The After-Treatment of Surgical Patients.** By Willard Bartlett, A.M., M.D., F.A.C.S., and Collaborators. In two octavo volumes; 1,040 pages; 221 illustrations and one colored plate. St. Louis: C. V. Mosby Company, 1920.

HOSPITAL SERVICE IN EMERGENCY.

At noon on Thursday, September 16th, there was exploded in the very heart of New York City's financial district a bomb that killed thirty-five people and injured—many of them very seriously—more than two hundred more. Before the smoke had cleared, the medical superintendent and internes from a nearby, small hospital, were administering first aid on the spot; and within a very short time most of the injured had been removed to this hospital by its three ambulances and by passing trucks and taxicabs. On the floor of its dispensary department 175 or more injured—and dying—men and women were treated, and about forty were admitted into the wards and rooms of this small Broad Street Hospital, already almost filled. Everyone of these people, whether the injury was slight or grave, received promptly a prophylactic dose of tetanus antitoxin, and, where needed, a hypodermatic injection of morphine. Hot drinks were administered. Several cases of shock were promptly handled; hemorrhages were controlled; first aid dressings and splints applied; emergency amputations performed; and within the next few hours all of the wounds, many leading to bad compound fractures, were thoroughly débrided, and started on Carrel-Dakin treatment and traction splinting.

That so much was accomplished so well and so promptly in a small hospital was due to the helping hands loaned by other hospitals, to the aid furnished—in material and in nurses—by the American Red Cross, to the fact that most of the resident staff, some of the attending surgeons, the supervising nurse and some of her assistants, were familiar with the handling and surgical treatment of large numbers of wounded through recent service overseas, and, finally, to the fact that this hospital had kept itself "on its toes" for just such emergencies. It had been treating accident cases every day for the three years of its existence and it was kept well supplied with the splints, Balkan frames, etc., that such serious injuries require.

The incident teaches an important lesson. This disaster happened where the two nearest hospitals, although both small ones, are equipped for the immediate treatment of severe traumata.

It might have happened, indeed large-scale accidents do happen, at places where the nearest hospitals are not so equipped. How many of our large semi-private hospitals have on hand as many as two dozen Thomas leg and arm splints for the prompt first-aid treatment of that many fractures? How many private ambulances, attached to hospitals and otherwise, any of which might be commandeered for service in emergency, are equipped with Thomas and other splints and with a generous supply of dressings?

The questions are pertinent. It would be worth while—indeed, it is a public duty—for every hospital, in every community, whatever its purpose, to equip itself with an emergency supply of those splints, dressings and medicaments that would be required if an accident in the neighborhood should bring several injured to its doors!

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ADVANCES IN PURE NITROUS OXID-OXYGEN ANESTHESIA: WITH A CONSIDERATION OF CYANOSIS, THE SIGNS OF ANESTHESIA AND A DESCRIPTION OF THE TECHNIC OF SECONDARY SATURATION.*

E. I. McKESSON, M.D., Anesthetist,
TOLEDO, OHIO.

In the preliminary, or induction stage of nitrous oxid-oxygen anesthesia, it is the usual practice to administer 100 per cent. nitrous oxid to produce unconsciousness as soon as possible by a primary saturation of the blood with the anesthetic gas. Very soon, however, a small amount of oxygen must be mixed with the nitrous oxid to prevent the jactitations and other manifestations of acute anoxemia. Now, if some fixed proportion of oxygen is decided upon it will be found *too small* for some and *too great* for others since patients differ in their mixture requirements. All of this is well known to gas-oxygen users. Preliminary, or what may be called *primary saturation* with nitrous oxid is about as far as many gas-oxygen anesthetics are carried, if the operation requires deeper relaxation it is the practice of many anesthetists to resort either to a mixed gas-oxygen-ether, or to a sequence ether with little or no attempt to avoid the unpleasant consequences.

It is not necessary to use ether in order to relax an abdominal wall—as it may be accomplished with gas-oxygen, by secondary saturation.

In a primary saturation only the actively circulating blood is saturated before oxygen must be administered. There remains in the muscles, and in all other tissues, considerable volumes of nitrogen and oxygen, which in the early minutes of narcosis enter the blood stream and dilute the nitrous oxid, which prevents a deeper anesthesia. In order to displace more of the non-anesthetic gases in the body with nitrous oxid, the technic to be described as secondary saturation has been devised.

PRELIMINARY OBSERVATIONS.

Any general anesthetic relaxes muscle, providing some coincident by-product or effect does not counteract this function.

In nitrous oxid anesthesia we may have sufficient anoxemia to produce muscular spasm when there would have been relaxation had the anoxemia been prevented. Yet by the usual technic it has not been possible to prevent the anoxemia and still have sufficient nitrous oxid concentration. Resaturation, or secondary saturation after the primary or induction saturation has been followed with oxygen, is the means of eliminating the excess of non-anesthetic gases and thus increasing the amount of anesthetic gas and oxygen in the desired proportions to produce anesthesia with relaxed muscles.

Eleven or twelve years ago in my early experience with gas-oxygen occasionally patients were accidentally overdosed with nitrous oxid, stopping respiration and requiring resuscitation with oxygen. I was impressed with the extreme ease and quickness of the restoration by inflating the lungs once or twice with oxygen. The phenomenon was so unusual when compared with the difficulties which followed accidental overdosage with ether or chloroform that it made a profound impression.

In attempts to secure deep anesthesia and muscular relaxation, these observations became more commonplace and it was soon learned that cyanosis, a dilated pupil, and apnea were easily corrected by inflating the lungs once or twice with oxygen, and that while these signs could not be disregarded nor neglected for a moment when they became apparent, nevertheless, the patient was in no serious danger if oxygen were available and put into the lungs promptly after saturation had occurred.

Another phenomenon was observed in this connection which has since been a most important means of securing a flacid abdominal wall. When fully utilized it has made it possible for me to obtain for the patient the full advantages of a pure gas-oxygen anesthesia and to eliminate from my practice the unpleasant and sometimes disastrous sequelae which even a small amount of ether produces. The phenomenon was this: *When a patient had been reoxygenated after resaturation complete muscular relaxation followed, and a patient who, prior to that time, had been too rigid for easy abdominal exploration was now ideal from the surgeon's point of view.*

At first the fear of accident prevented the intentional utilization of this procedure in clinical practice and only in accidental overdosing was further observations made. The patients were studied from many angles; careful records of pulse, respiration, blood pressures, pulmonary ventilation, rebreathing, and the mixture of gas-oxygen were tabulated on every patient during the narcosis that an opportunity to study a case when one presented might not be lost.

These observations of blood pressures and other factors, unexpectedly exploded the theory that gas-oxygen elevated the blood pressure and, therefore, the danger from this factor was eliminated as early as 1911 and reported at a previous meeting of this Association.

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*Read during the Eighth Annual Meeting of the American Association of Anesthetists, Hotel Grunewald, New Orleans, April 26-27, 1920.

After 3 or 4 years observations of these occasional cases the conclusion was reached, that a patient might be crowded to the limit of saturation without great danger if oxygen could then be instantly forced into the lungs. The method was tried in those cases, at first, in which ether was clearly contraindicated and in whom sufficient relaxation by the usual technic for pure gas-oxygen was not readily obtainable. Gradually its use has been extended to include *any* case in which marked relaxation of abdominal muscles is desired.

Many times patients have been brought from what appeared to be a well developed fourth stage, with dilated, fixed pupils, the deepest cyanosis, complete spastic apnea, and general board-like rigidity, into a beautiful placid relaxed pink patient in from 10 to 20 seconds with every appearance of normal slumber.

This illustrates the remarkable flexibility of nitrous oxid and oxygen and its wonderful safety, but it also illustrates the important clinical fact that a patient may be more completely saturated with nitrous oxid than has been generally practiced or thought possible.

THE PRINCIPLE OF N_2O-O SATURATION.

The principle of nitrous oxid saturation is not radically different from ether or chloroform saturation. It requires, of course, a much higher concentration for a few moments than is required with the latter agents and to secure this concentration, oxygen is temporarily cut off or markedly reduced below the proportion which will be administered after the saturation.

In most gas-oxygen anesthetics as given in the past, the patients have been only partly saturated, and reflexes, or rigid muscles resulted just as occurs under light anesthesia with ether, chloroform, or any other general anesthetic.

Because of the essential differences between the affinity of ether or chloroform for the tissues and their very low affinity for nitrous oxid any certain degree of saturation has been difficult to maintain without very accurate administering appliances and a more accurate appreciation of signs indicating changes in the depth of narcosis under the latter agent.

The extraction specialists of years ago and today produced primary saturation and approached secondary saturation in many of their obstreperous patients before beginning to extract teeth. Had they required the relaxation needed in abdominal surgery and possessed the means for using oxygen which we now have, the technic for secondary saturation no doubt would have been developed by them, because they were not afraid of cyanosis, which is the stumbling block in the minds of the ether or chloroform-trained anesthetists and surgeons. The extractionists soon learned that nitrous oxid (without oxygen) usually produced anesthesia slightly later than the onset of well marked cyanosis and he, therefore, rarely removed the inhaler until his patient was fairly black. Yet under such a technic with all sorts of patients he established a record for safety with nitrous oxid which has not been approached by any other anesthetic agent.

THE PROBLEM OF CYANOSIS.

The fear of cyanosis by the surgeon and anesthetist has been one of the most powerful influences in holding back the progress of nitrous oxid and oxygen. It is the most natural thing to administer oxygen when the skin becomes dusky and to stop the further development of narcosis by so doing. General ignorance concerning the significance of cyanosis itself and how much cyanosis from a certain cause will be tolerated for certain periods of time, are subjects worthy of investigation and review.

Cyanosis as a sign indicating the depth of anesthesia, is not only absolutely valueless but misleading and dangerous, because one patient may be cyanotic and still conscious, or even fighting, while another may be pink, overdosed and dying from the same mixture of nitrous oxid and oxygen.

The following unusual and remarkable case in my recent experience illustrates this point: Mrs. C., a middle-aged woman, had twelve infected teeth to be removed. She had four or five blood transfusions, one recently, for an anemia of four years' standing. The hemoglobin index was 27 per cent. and the red cell count 1,250,000. She was excitable, weak, and spent much of her time in bed. Nitrous oxid-oxygen was selected by the consultants as the safest anesthetic for this patient. The usual technic of induction with 100 per cent. nitrous oxid was begun January 5th, 1920, but at the end of the third inhalation, while the ear and nails were distinctly pink, (they had been previously quite pale), respiration stopped, the eyelids opened, and the pupils had dilated until only a ring of iris could be seen. The muscles were completely *relaxed* in every part of the body. The carotid pulse was weak but regular and easily felt.

The lungs were at once inflated or about half filled with oxygen—*twice*, and within ten seconds the iris began to contract; within a few more seconds respirations resumed regularly.

On account of the few breaths required to thus overdose patient, it was evident that the nitrous oxid would need to be highly diluted with oxygen to prevent recurrence and, therefore, the apparatus was set for 30 per cent. oxygen and only 70 per cent. nitrous oxid. But the same signs recurred within 5 or 6 breaths, and again she was recovered with two inflations of oxygen. Now, 50 per cent. oxygen and 50 per cent. nitrous oxid was administered and after several breaths the pupil began to slowly dilate and respirations became weaker. After a breath of 100 per cent. oxygen was administered, and to prevent the further development of overdosage 40 per cent. nitrous oxid was next tried. This mixture proved to be the ideal mixture for the patient and no further difficulty was experienced while the operation proceeded.

The operation lasted 20 minutes in which the teeth were removed, the aliveolar process trimmed smooth with rongeurs the gum margins trimmed and sutured so as to restore mastication by artificial dentures within a few days.

Semi-consciousness following the operation lasted for 30 minutes (instead of a few seconds) which was no doubt due to her unusually weak condition and to her anemia.

While it is still too early to determine the ultimate results of the operation there has been a gradual improvement up to the present time.

Besides illustrating the fact that a patient may be overdosed with nitrous oxid without showing cyanosis, this extreme case emphasizes the importance of the true signs of anesthesia as a guide to the anesthetist, and the necessity for being prepared to surely resuscitate a patient when respirations are accidentally stopped by over-saturation with nitrous oxid regardless of the proportion of oxygen which may have been used up to that time. Another unusual phenomenon occurred in this case: the moment when overdosage occurred each time, as well as at other times, there was no muscular rigidity, but extreme relaxation instead, because no time was there anoxemia or cyanosis to produce spacticity. In the usual case when saturation is first attained the coincident anoxemia causes the muscles to become boardlike or spastic, but relaxation comes promptly when sufficient oxygen is restored to them. In the case described we had sufficient nitrous oxid concentration to produce relaxed muscles, and at the same time enough oxygen in the mixture to prevent anoxemic spasticity.

PRIMARY AND SECONDARY CYANOSIS.

Cyanosis may be classified as primary and secondary: *Primary* due to changes in the blood itself, and *secondary* due to local or external causes capable of increasing the oxygen depletion of the blood. Cyanosis is due to the deoxidation of oxyhemoglobin to reduced hemoglobin—it is a physiological process carried beyond the usual limits.

Blood normally leaves the lungs about 95 per cent. saturated with oxygen, therefore having only 5 per cent. unsaturated. There will be a larger portion of it unsaturated if aeration is interfered with by inspired mucous, blood, a restricted airway, or by a reduction of the oxygen administered as in anesthesia.

That cyanosis per se is not incompatible with life is illustrated in Morbus Caeruleus, aviation, pneumonia, and in bathers exposed to cold air.

In old age when metabolism is lower, less oxygen is consumed in the tissues, and less cyanosis reults from oxygen restriction. The old folks are usually ideal patients for gas-oxygen, easily handled and rarely requiring secondary saturation to produce relaxation. The young adult on a similar oxygen percentage in the anesthetic mixture usually shows a greater degree of oxygen unsaturation and more cyanosis.

The flow rate of the blood may be altered so as to increase oxygen unsaturation or cyanosis in terminal toxemias, such as peritonitis or endocarditis, or again from a deficient septum between the ventricles.

Then the blood itself greatly influences cyanosis: The anemic patient on a given mixture of nitrous oxid and oxygen producing normal anesthesia, obtains enough oxygen to oxidize the small quantity of hemoglobin she carries while the full-blooded drayman on the same mixture would probably be cyanotic because the oxygen would be sufficient only to oxidize from 50 to 75 per cent. of his hemoglobin.

In well marked anemia, with less than 50 per cent. hemoglobin cyanosis is rarely seen, with 30 per cent. or less, cyanosis cannot ordinarily be produced before death.

It is, therefore, obvious that the fear of cyanosis is sometimes well founded and at other times unwarranted. Under ether or chloroform, cyanosis is usually a serious omen—an indication of serious heart embarrassment, or restricted respiration from overdosage or other causes. It is not usually due to a restriction of oxygen administered or inhaled.

In thousands of administrations degrees of cyanosis have been produced for variable lengths of time under nitrous oxid-oxygen with no ill effects, which if seen under chloroform or ether would in a fair percentage of cases result fatally. The difference is in the cause.

TOLERATION OF CYANOSIS.

In an operation case one must be able to determine the cause of cyanosis if it occurs, and whether it is controllable or not—before concluding that it is detrimental. *A patient will tolerate very deep cyanosis for some minutes, a moderate amount for hours and a slight cyanosis for long periods if due merely to a restriction of oxygen administered to the lungs for absorption.*

McKESSON'S N_2O-O SIGN CHART

Copyright

LIGHT ANESTHESIA	NORMAL ANESTHESIA	PROFOUND ANESTHESIA
Due to too much oxygen in the mixture.	Due to a properly balanced mixture of N_2O-O.	Due to too much N_2O in the mixture or to partial obstruction of respiratory passages.
RESPIRATION (a) Superficial slow breathing usually regular. (b) Prolonged inspiration. (c) Phonation due to reflexes or pain. (d) Holding breath, grunting.	RESPIRATION (a) Full "machine like" respirations. Regular and faster than normal. (b) Inspiration and expiration nearly equal. (c) No phonation. (d) Continuous uninterrupted respiration.	RESPIRATION (a) Irregular rhythm (sobby) usually slower than normal. Spasmodic. (b) Prolonged expiration. (c) Phonation due to muscular spasm of vocal cords. Often crowing. (d) Cessation of respiration from spasm of muscles of exhalation.
MUSCULAR PHENOMENA (a) Movements or rigid muscles. (b) Facial expression of pain or consciousness. (c) Nausea, very rarely. (d) Reflex, or voluntary resistance.	MUSCULAR PHENOMENA (a) Immobile and relaxed, but having normal muscular tonus. (b) Expression of normal sleep. (c) Quiet. (d) Quiet. Relaxed.	MUSCULAR PHENOMENA (a) Clonic movements, twitching or jerking in early minutes of induction, often start in upper eyelids. (b) Expression wild looking. (c) Swallowing, retching or vomiting, common. (d) Tetanic, spasm, marked rigidity—opisthotonus in some cases.
THE EYE (a) Pupils large, contract to light actively. (b) Conjunctive sensitive. (c) Eyeballs roll. (d) Eyelids resist opening, winks when touched.	THE EYE (a) Pupils small or medium fixed. (b) Conjunctive insensitive to touch. (c) Eyeballs fixed or slowly roll. (d) Lids often slightly open, relaxed, no winking.	THE EYE (a) Pupils fixed, enlarge progressively and finally become irregular in shape. (b) Conjunctive insensitive. (c) Eyeballs fixed in some position or jerk. (d) Eyelids stiff. Often wide open.
COLOR IN SKIN (a) Pink or no change normally. (b) In anemics, no color change (c) In plethorics, slight cyanosis.	COLOR IN SKIN (a) Varies from pink to decided cyanotic tint. (b) In anemics, no color change. (c) In plethorics, considerable cyanosis.	COLOR IN SKIN (a) Usually cyanotic. (b) In anemics, slight flushing, rarely cyanosis. (c) In plethorics, almost black.
REMEDY Decrease the percentage of oxygen in the mixture.		REMEDY Increase oxygen in the mixture or in (d) inflate lungs with pure oxygen 1 to 3 times.

THE SIGNS OF ANESTHESIA.

The only true signs of anesthesia clinically which are of value, are those manifested through the patient's muscular system. Movement, or its absence, is significant. In the accompanying table color is tabulated principally to show its usefulness as a guide in order to counteract the often repeated statements in anesthetic literature regarding its supposed value.

The third stage of anesthesia as described in the text books is here divided into three planes:—light, normal, and profound anesthesia. The third plane or profound anesthesia, borders upon the fourth stage and merges into it with the (d) group of signs. The signs of the third plane are the guides to secondary saturation, as well as the limits of anoxemia, which are momentarily permissable in producing secondary saturation.

THE TECHNIC OF PRIMARY SATURATION.

Anesthesia is induced as usual by administering 100 per cent. nitrous oxid until the first muscular phenomenon of oxygen hunger is observed. This may be and is usually a change in character or rate of respiration accompanied by a little snort, a twitch of the eyelid, jerk of the hand or foot, or some similar anoxemic muscular contraction—clonic in character.

This is the patient's first signal for oxygen and marks the moment when oxygen should be added to the nitrous oxid in sufficient proportion or percentage to prevent temporarily the further development of anoxemia. What this percentage of oxygen shall be is determined by the susceptibility of the patient, which is roughly determined by the length of time required or the number of breaths of pure nitrous which the patient inhaled before anoxemia developed. If short, the percentage of oxygen may be greater than if anoxemia comes on slowly. But in the usual case with the first sign of anoxemia 5 to 6 per cent. oxygen is then mixed with the nitrous oxid, increasing or diminishing it, as the signs of anesthesia may indicate while attempting to obtain the *normal plane* of anesthesia. Thus, the first two or more minutes of narcosis will pass before it will be determined whether the *normal plane* can be secured without secondary saturation or not—whether it will be necessary to further saturate with nitrous oxid in order to rob the tissues of their excess of oxygen and nitrogen and thus prepare for muscular relaxation.

THE TECHNIC OF SECONDARY SATURATION.

If relaxation has not taken place when other signs indicate that the patient is in normal anesthesia and if relaxation is essential to the success of the operation, see that plenty of oxygen is available, and know by previous trial upon yourself that the apparatus will actually inflate the lungs with pure oxygen, then proceed to secondary saturation as follows:

A. DEOXYGENATION: Reduce the proportion of oxygen or administer 100 per cent. nitrous oxid until the pupil dilates (beware of glass eyes and an adherent iris), tonic muscular spasm or rigidity develops, respiration becomes slow or stops.

B. REOXYGENATION: Then administer one breath of 75 to 100 per cent. oxygen if the patient inhales, and if he does not, partly fill the lungs by inflation with pure oxygen once or twice—usually once is sufficient. The cyanotic color now begins to lighten, the pupils retract, the pulse is normal or slower than before, the muscles become perfectly relaxed and presently respirations resume.

If care is taken not to administer too much oxygen or too many breaths of oxygen, which will in itself, desaturate, the period of relaxation may last throughout the operation or it may be necessary to resaturate if air leaks into the respiratory channels of the apparatus, and thus displaces the nitrous oxid with an excess of nitrogen and oxygen in the blood.

There are also good reasons for believing that air is slowly but sufficiently absorbed through the skin and open abdomen to destroy the nitrous oxid saturation, in some cases necessitating resaturation at the time of closing the abdominal wound. At this time another advantage may be taken of the procedure to immobilize the abdomen for a few seconds while closing the peritoneum.

After reoxygenation of secondary saturation is begun there are from 5 to 20 seconds when the patient does not breathe because of the excess of oxygen in the blood and brain, and if this phase of secondary saturation is properly timed it not only gives the surgeon a perfectly flacid abdominal wall, but also a quiet peritoneum to sew.

CONCLUSIONS.

1. Primary saturation of the patient with nitrous oxid fails in some cases to produce sufficient relaxation for certain operations.

2. Nitrous oxid produces muscular relaxation when it is sufficiently concentrated in the tissues and associated with enough oxygen to prevent anoxemic rigidity. High concentration of this gas in the tissues is required to displace the non-anesthetic diluting gases.

3. The technic of secondary saturation which I have described and used extensively for several years, intensifies nitrous oxid anesthesia and produces sufficient relaxation for any operation.

4. Secondary saturation is readily lost by subsequent errors in the mixture administered, leaks of air into the patient's air passages and probably by absorption of air through the abdominal cavity and skin requiring occasional resaturation in some cases.

5. Its successful and safe employment depends upon an apparatus capable of inflating the lungs with oxygen should the patient be crowded intentionally or accidentally into spastic apnea. It depends also upon an accurate interpretation of the signs of anesthesia, but disregarding the pres-

ence or absence of cyanosis as an anesthetic sign.

6. Secondary saturation is followed by no post-anesthetic sequelae—which are detrimental or which may be attributed to its use. I believe it is safer for the patient than an ether sequence or combined gas-oxygen—ether mixture and convalescence is decidedly better when even the small amount of combined ether is avoided in the narcosis.

2233 Ashland Ave.

RELAXANTS IN NITROUS OXID-OXYGEN ANESTHESIA.*

Ansell M. Caine, M.D.
New Orleans, La.

Nitrous oxid-oxygen would be the anesthetic of choice in most cases when there is a run down condition due to sepsis or other trouble; when there is a toxic condition due to absorption of bile from common duct obstruction; when kidney lesions are present, and when any other of the vital organs is involved with the exception of the heart, were it possible to always get good relaxation. Most cases are relaxed sufficiently with gas-oxygen alone where the operation is on the neck, breasts, extremities, face, vagina and superficial lesions, but for abdominal cases it is in the experience of the writer, practically impossible to get good relaxation without the assistance of other agents. It is true that what is sufficient relaxation for a surgeon who is used to operating under gas-oxygen anesthesia is insufficient for another who is used to the profound anesthesia of ether. The anesthetist has both these classes of operators to deal with, but the latter class far predominates.

The problem of overcoming this objection to what otherwise is, in many respects, rather an ideal anesthetic agent, has engaged the attention of anesthetists for some time. If the rigidity is due to too little oxygen, or too much oxygen the remedy is easily and quickly applied by increasing or diminishing the percentage. Slight positive pressure assists to some extent in deepening the narcosis, but this raises the blood pressure and is objectionable from that standpoint.

Warming the gases to body temperature helps also to deepen the anesthesia by causing the blood to take up the anesthetic agent more rapidly.

Preliminary hypodermic injection of morphin and atropin is of great help as it serves the double purpose of quieting the patient and thus assisting by causing better respiration, and by diminishing the troublesome flow of mucus.

Local injection of novocain along the line of incision in the skin, facia and muscle is probably the best thing mentioned thus far to secure relaxation. It eliminates the impulses going to the brain from stimulation due to traction on the muscles.

But even with all these aids, and all of them help to some extent, still there is a lack that has to be filled by some one or more of the more profound agents at our disposal. The one in most common use is ether. It does the work too, but sometimes we use more than we want to use in order to secure results, and as a consequence, the patient is upset almost as much as if we had not used gas at all. Even at that however, less ether is used than otherwise would have been used, and there is a corresponding reduction in damage to the kidneys.

CHLOROFORM AS A RELAXANT.

Chloroform has been used by the writer a great many times for this purpose. It does the work too, but acts rather slowly and is prone to give rigidity before relaxation sets in. Then too unless it is given very slowly, spasm of the larynx occurs and gives a great deal of trouble to the patient, to say nothing of heart failure and grey hairs to the anesthetist. Furthermore each apparatus must be tested as to the maximum dosage at the average flow of gas that it picks up on its way to the bag, and the anesthetist must keep well within the safety limits. This is a disadvantage to all apparatuses that have the warming device on the proximal side of the ether attachment. In that case one never knows just how much of the ether, chloroform or anesthol, that is picked up, as the temperature varies. For that reason I have eliminated the warming attachment that comes with my apparatus, and have placed another between the ether attachment and the bag. This gives a more or less uniform temperature to the gas when it passes through the ether attachment, and warms it for the patient afterwards. In hospital work where a truck and large cylinders are used, an additional stand can be attached to the truck, and on this an ether bottle, an aspirating pump and bottle, and a box for the anesthetists accessory equipment can be attached. Chloroform may be placed in the original bottle and ether in the bottle on the stand. By this means the gas and oxygen may be given alone, with chloroform, ether or with both. At the same time the aspirating apparatus is available either for the anesthetist or for the surgeon. This platform with attachments is easy to attach and is not in the way, resting as it does beneath the gas-oxygen apparatus. This accessory ether bottle makes it very simple to administer ether-oxygen in sequence to gas-oxygen.

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*Read during the Eighth Annual Meeting of the American Association of Anesthetists, Hotel Grunewald, New Orleans, April 26-27, 1920.

THE USE OF ANESTHOL.

Another agent, or combination of agents, I have been using with satisfaction is anesthol. This has an advantage over chloroform in that it acts quicker and, I believe, is safer. It relaxes better, too, in my experience. The depressing action of the chloroform and ethyl chlorid is more or less counteracted by the stimulating action of the ether. It is not unpleasant, and is easily prepared by the anesthetist. Only a small quantity is necessary as a rule, as it does not have to be given over an extended period. In those cases that seem inclined not to relax and the surgeon is having trouble with abdominal contents that obstructs his work, we do not hesitate to switch to ether-oxygen, supplementing it, if necessary with the anesthol, believing that less damage is done with good relaxation under ether and gentle manipulation of the gut, than with poor relaxation with gas and undue handling of the intestines. In the change to ether-oxygen we use the closed mask if everything goes well, otherwise we connect the simple open mask of Gwathmey. What was a difficult case often becomes an easy case when this is done, and the after effects are reduced to a minimum. We find that 6 per cent. by volume usually is sufficient to relax, and we have never given over 8 per cent. and that for only a very short time.

1640 ROBERT ST.

THE FOLLOWING IS THE MOTTO OF THE INTERSTATE ANESTHETISTS FOR 1920:

"THE ESSENTIALS FOR SUCCESS IN THE PRACTICE OF ANESTHESIA ARE PERSONALITY, ABILITY AND EQUIPMENT. NO ANESTHETIST EVER MAKES A REAL SUCCESS OF THE SPECIALTY WITHOUT CONVINCING PATIENTS OF AN INHERENT DESIRE TO TRULY SERVE THEM. PERSONALITY CANNOT BE EXPRESSED IN MERE WORDS; IT MUST SHINE FORTH IN THE STERLING CHARACTER OF THE ANESTHETIST AND MUST EVIDENCE ITSELF IN EVERY ACTION IN BEHALF OF SUFFERING HUMANITY. THE MEASURE OF THE ANESTHETIST'S ABILITY DEPENDS UPON ADEQUATE EDUCATION, NATURAL ENDOWMENTS, AN APTITUDE FOR THE SPECIALTY AND CONSCIENTIOUS WORK. ABILITY NOT ABOVE THE AVERAGE AND LEFT UNDEVELOPED EVENTUALLY FAILS OF ACHIEVEMENT. NO ANESTHETIST WITH THE PRIDE OF ABILITY OR THE DESIRE FOR EXCEPTIONAL SERVICE WILL HANDICAP SUCCESS BY FAILING TO PROVIDE ALL THE LATEST AND BEST EQUIPMENT FOR THE PRACTICE OF THE SPECIALTY. THIS IS NOT MERELY A PRIVILEGE BUT A DUTY."

THE OPEN METHOD OF NITROUS OXID-OXYGEN ANESTHESIA.*

JAMES T. GWATHMEY, M.D.,
NEW YORK CITY.

The method is called *open* in contradistinction to the face mask and rubber bag method usually employed in administering nitrous-oxid and oxygen and in which air is excluded as far as possible. The *open method* referred to in this paper is the equivalent of the drop method of ether, the mask of which is usually so covered with towels that it is hard for an onlooker to understand why the term *open* is used in connection with it. My mask is also covered with towels, nevertheless the method seems to offer certain advantages over the usual closed method, and for this reason I decided to submit it to the Association at this time. It is not intended to take the place of the usual method of employing nitrous oxid and oxygen, but is offered as a substitute for the *open-drop* or any other method of administering ether, and also as an aid in enesthetizing certain patients to whom the closed method seems a burden.

A mask is used just twice the size of the Mayo ether mask, and is sufficiently large to hold a full inspiration of an adult. With a larger mask it might be possible to fully anesthetize a patient with the gases alone, although this is not desirable, if our theory of narcosis is correct. The open method may be used with any gas-oxygen machine, as all machines have attachments in which may be placed the additional medication needed with the open method. The technic will be described as employed with the Gwathmey apparatus.

ADMINISTRATIVE TECHNIC.

The technic about to be described presupposes preliminary medication of some kind.

The mask, upon which has been placed several layers of gauze, scented with the essence of orange or oil of bitter orange peel, is placed in position and the patient told to breathe through the mouth, if possible, but in an easy and natural way. Under no circumstances should straps or holding bands be placed on the patient, either at this or any other time. If any sensory reflexes get through to the brain, requiring restraint, then we have not a true anesthesia, and the sooner we drop the agent or technic that requires this additional help and have our inhalation anesthesias approach the same perfection that is attained with good local or spinal analgesia, the better it will be for our patients and ourselves.

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*Read during the Eighth Annual Meeting of the American Association of Anesthetists, Hotel Grunewald, New Orleans, April 26-27, 1920.

The objects of all methods of anesthesia, whether local, regional or general, is to isolate the brain during the operation, and to leave the patient in such condition that little or no reaction is possible afterward.

The anesthetic is started with three holes of nitrous oxid and one of oxygen; in ten or fifteen seconds the anesthol valve is turned slightly, just enough to have the gases barely bubble through, and from this on it is very gradually increased until there is a slight bead on top of the liquid; time, one minute to a minute and one-half. The patient is now unconscious but not anesthetized. The technic from this on will vary with the substances to be used in connection with the nitrous oxid and oxygen. If only nitrous oxid-oxygen and anesthol are to be used, the anesthol is turned on just a little more until the breathing of the patient is automatic, when it is turned back to the second position. The oxygen valve is now turned to the second hole and the oxygen and nitrous oxid remain thus proportioned throughout the operation, the depth of anesthesia being regulated by the anesthol. Toward the close of the operation the anesthol is turned off, and it will be found that the patient will be very easily kept under with the gases alone. Finally, the nitrous oxid is turned off and the oxygen alone allowed to run for two or three minutes through the third and fourth holes, but not until the patient is entirely conscious. The mask is now removed, and within a few minutes the patient can answer questions intelligently, but is best left undisturbed to sleep through the pain zone, which usually lasts from one to two hours. The return of the brain to its usual activity is as if from a quiet night's rest and with no reaction afterwards.

VARIATIONS IN TECHNIC.

The method just described is the simplest, and the management of the gases is the same throughout, but the technic may vary considerably as follows:

If the second container holds ether, this valve is turned on slightly as the patient becomes unconscious, or at the end of a minute and one-half. If the swallowing reflex asserts itself, it is turned off again, and this movement is repeated until there is no swallowing reflex when the ether is allowed to remain on. The anesthol may be turned off at this time, and gas-oxygen-ether used throughout, or gas-oxygen-anesthol and ether. If, instead of ether, the second container holds three to four drams of paraldehyde, this valve may be turned on gradually to full at the end of a minute and a half and the anesthol turned off. The nitrous oxid-oxygen is allowed to blow over the top of the paraldehyde. If the narcosis becomes too light, the nitrous oxid may be increased for a short time, or the anesthol may be turned on again, the narcosis being easily regulated in either of these ways. With any of these methods, the patient's transition from consciousness to full surgical anesthesia is smooth and tranquil and the stage of excitement or struggling is omitted. The time required to reach full surgical anesthesia is from three to five minutes.

Paraldehyde combines very readily with nitrous oxid and oxygen, and while small amounts not over one dram per hour are taken up when used as described above, this small amount makes an appreciable difference in the perfection of the anesthetic and in the comfort of the patient afterwards. With any of the technics described, the patient is fully oxygenated at all times, has a pink color from start to finish, and blood pressure is even.

The theory upon which this special form of anesthesia depends, is based upon the fact that each of the agents used affect the nervous mechanism in a different place and in a different way with a resultant anesthesia that is more nearly perfect than if any one agent is used.

THE VALUE OF THIS METHOD IN DENTISTRY.

It seems, from clinical experience, that the brain is better protected from shock or sensory impulses when a number of narcotics and anesthetics are used, than when some single agent is employed. The following data would seem to prove this hypothesis. A certain dental specialist in New York City, who has extracted over 80,000 teeth during his professional career, at my suggestion uses a 50 per cent. mixture of paraldehyde and anesthol in connection with his nitrous oxid and oxygen, merely passing the nitrous oxid and oxygen over this mixture. Each patient gets in addition to the nitrous oxid and oxygen approximately 00 drops of paraldehyde, 00 drops of chloroform, 00 drops of ethyl chlorid and 00 drops of ether. This estimate is based upon the supposition that *anesthol* is what it is claimed to be, that it combines in stable chemical union 35.89 per cent. of chloroform, 17 per cent. of ethyl chlorid and 47.10 per cent. of ether, with a boiling point of 40° C. (104° F.). The usual time of administration is one and a half minutes, with a resultant anesthesia so perfect that this dentist has one and a half minutes in which to do his work. Where formerly a large circingle was used for certain classes of patients, athletes and alcoholics, for the protection of both patient and dentist, this has now been discarded and is never used. Not only is the resultant anesthesia more perfect than when the gases are used alone, but the patients leave the chair and walk from the room usually unassisted and without nausea, headache or vomiting. This dentist states that under no consideration would he go back to the old method of using the gases alone. The new method is not only better for the patients, but this operator states that he himself walks from his office after a hard's day's work feeling entirely different from the bedraggled condition in which he formerly lived.

The clinical experience of one with 80,000 cases to his credit cannot be discarded lightly. I have seen a traffic cop, an athlete in the pink of condition, anesthetized in this dentist's office as easily as an obedient and submissive child. On the other hand, I witnessed a sailor come in to another clinic where only gas and oxygen is used. This patient was strapped down in the usual way and additionally several volunteer aides assisted in the holding. When the extraction finally occurred, there was no question about the brain being unprotected, and the seas were rolling high when he was escorted from the room. And yet I have never seen nitrous oxid and oxygen more carefully and evenly given, nor with better results, in the usual run of cases than in this very clinic. The sailor was, of course, an exceptional case; so was the policeman.

These illustrative cases are given, not to compare one clinic to another, but to compare the administration of nitrous oxid and oxygen alone, and also when administered with a number of drugs. We have the comparison not only of the two clinics, but of the same operator using the two systems. The *clinical* test is the final one and the above data to me is conclusive. It makes no difference whether the agents used are given preliminarily or at the same time, or both preliminarily and at the same time—the results are the same provided, of course, that you get the full physiological effect of the drugs used.

ILLUSTRATIVE CASE REPORTS.

Only recently I had four prostatectomies in patients between forty and sixty years of age. Each patient received preliminarily fifteen grains of chloretone by mouth, one hour before, and one-quarter grain of morphin and 1/150 of atropin forty minutes before operation. Operations averaged one hour each.

Gas-oxygen-anesthol or gas-oxygen-paraldehyde and anesthol open method, were used. One ounce of anesthol per hour and three-quarters of a dram of paraldehyde were the amounts given.

Patients were perfectly relaxed throughout, but were entirely conscious before leaving the operating room. None of them were sick in the slightest degree or showed any untoward reaction whatever. Most of them dozed for several hours afterward. A child four years old was anesthetized by this method for one hour, for a cystosopy. It was perfectly quiet during this time, but slept for twenty minutes after the anesthetic was discontinued, and then awoke in a perfectly normal condition. The same child had a kidney removed one month later under the same anesthetic technic, with resultant perfect anesthesia and with no reaction whatever afterwards. Gas-oxygen and anesthol was used—about ½ ounce of anesthol per hour.

OBJECTS AND ADVANTAGES.

The open method of nitrous oxid-oxygen-ether or nitrous oxid-oxygen-anesthol-ether can be used wherever oxygen-ether has been used in the past. Dr. Lumbard, who uses oxygen-ether quite extensively, states that the average amount used with this method is three and one-half ounces per hour. Dr. J. C. Gates, of New York City, states that the average amount used with this method is one ounce of ether per hour in addition to the anesthol required in the induction. The principal objects in using this method is to abolish respiratory difficulties during operation by obtaining more complete relaxation than is usual with any closed method and at the same time reduce to a minimum the disagreeable after effects obtained with ether as usually administered. These objects have been, in a very great measure, realized—but the last word has not by any means been spoken either on this particular technic or on any other method or agent used. This method is merely offered as a simple, safe and efficient way or hypnotic for those who have not had the technical training necessary for the closed method, or for those who wish to improve their technic in administering ether, or who wish to test in a perfectly safe or sane way the theory annunciated in this paper, that is a combination of narcotics and anesthetics isolates the brain from reflex stimuli more thoroughly than any other method of general inhalation anesthesia now in common use.

40 East 41st St.

THE VARIOUS ASSOCIATIONS OF ANESTHETISTS ARE TRYING TO SECURE A SECTION ON ANESTHESIA IN THE A. M. A. DO YOUR BEST TO HAVE YOUR STATE MEDICAL SOCIETY ENDORSE THIS MOVEMENT AND INSTRUCT ITS DELEGATES TO VOTE FOR SUCH A SECTION AT THE BOSTON MEETING, JUNE 6-10, 1921.

ANESTHESIA IN WAR SURGERY

ETHYL CHLORID GENERAL ANESTHESIA FOR WAR SURGERY.

Luigi Caforio, M.D.,
Assistant Professor of Surgical Pathology; First Captain of the Medical Corps; Departmental Head Military Hospital Regina Helena (No. 8) of the C. R. I. Surgical Department.

I do not make any claim, in this publication, to any new discovery. My object is to cooperate in the improvement of an anesthesia, which has heretofore not attracted the attention it deserves, and to set forth the results of my personal experience in the field of ethyl chlorid narcosis. From the results of my own experience I am convinced that if ethyl chlorid general anesthesia were more largely employed, many advantages would accrue to surgery in general and to war surgery in particular.

I am surprised to find that while kelene general anesthesia has been resorted to systematically for many years past abroad, and especially in America, in ordinary surgical operations, in Italy few surgeons have given any attention to it while many of the profession do not even know of its existence. I am still more surprised when I note how eminent surgeons and skilled practitioners, to whom I have shown the practical advantages of this method on the operating table, have neglected to adopt the same, in spite of the fact that they have acknowledged its advantages and its usefulness.

This negative attitude is absolutely unjustified especially in view of the fact that all books published on this matter during the last 30 years show an almost unanimous consensus of opinion in favor of kelene anesthesia, which does not present any greater risks or dangers than those presented by other anesthetics in general use, such as chloroform and ether.

HISTORICAL CONSIDERATIONS.

It is needless to survey the entire history and the different phases of general anesthesia by means of ethyl chlorid. A very detailed report on this process is to be found in the standard work of Girard (*Revue de Chirurgie*, 1902), to which I refer the reader. I shall simply say that the original observations of Richardson (*Medical Times and Gaz.*, 1877), of Steffen (*Brit. Medical Journal*, 1918), of Dujardin-Beaumetz (*Diction de Terap.*, t. II, p. 574, 1885), of Carlson (*Zahnarzliches Wochenblatt*, 1895), of Billeter (*Shw. Vierteljahr. f. Zahn*, 1897) and the even more detailed observation of Von Hacker (*Beitr. f. Klin, Chirurg.*, 1898), of Wiesner (*Wienmedizinische Woch.*) of Polloson (*Province Medicale*, 1900), of Tuttle (*New York County Med. Associat.*, 1900) not to mention other authors, have concordantly borne out the great practical value and the efficiency of general kelene anesthesia. Since 1900, observations have become more and more numerous and ethyl chlorid narcosis, at least in foreign clinics, has been a routine method of narcosis in short operations.

Nougue (*Arch. de Stomatol*, 1901) recommends this method in first aid surgical operations: Doyen (*Revue critique de medicine*, 1901) advises its use in field surgery; Fromaget (*Presse Medicale*, 1901) publishes 100 cases of perfect application of kelene anesthesia in eye operations; Malherbe (*Nuova Riv. clin. terap. anno V*), publishes 140 cases, Guinard (*Bull. et Hem, de la Soc. de Chir.*, 1902) announces that he is going to resort exclusively to anesthesia by the inhalation of ethyl chlorid.

In Italy Schifone (*Policl. Sez. Chir.*, 1904) and afterwards Cassanello (*Arch. ed atti della Soc. Ital. di Chir.*, 1905) set forth the harmlessness and the unobjectionableness of kelene anesthesia. Thereafter the endorsers increased year by year so that it was very difficult to refer even in a superficial manner to the works and treatises published in the last 30 years.

ETHYL CHLORID IN WAR SURGERY.

I refer to the most important works published in this connection only to show again that in view of the general adoption of ethyl chlorid inhalations, in view of the safety and good results of this method, and of the advantages it offers, it is now time for it to be introduced in Italy, especially in war surgery which calls for quick, short, speedy operations which very often cannot be preceded by a preparatory period for the administering of the anesthesia and which are most of the time to be performed without the help of the complicated equipment intended as a safeguard against possible contingencies.

One should remember that kelene anesthesia is brought on in a few moments and that it disappears with like speed, the patient recovering without external stimulant. One should remember that this anesthesia, due to its swiftness and to the absence of untoward complications, may be resorted to by any physician unskilled in the administration of anesthetics. One should consider that upon his awakening, the patient is not troubled by nausea, vomiting, headaches, dizziness, so that it is possible to apply this narcosis even without the usual preparation of cathartics and fasting, and that the patient can, after the anesthesia, take without danger his ordinary food, which facilitates the hospital service. Taking into account all these special advantages one cannot fail to appreciate the actual merits of this method of anesthesia.

SCOPE AND UTILITY.

Due to the short action, one cannot advise this method of anesthesia for complicated and long operations, but whenever we are called upon to perform operations of ordinary surgery, such as incisions of phlegmons, abscesses, honeycomb ringworm tumors, removal of cysts and other superficial tumors of the skins, crushing of amygdala, removal of ingrown nails, etc., what shall we do? Is it not true that in war surgery we very often are called upon to perform operations for the extraction of splinters and projectiles, for straightening stumps, for small amputations, for treating open wounds, for setting fractures, etc.? What are we wont to do in such cases? Either we have recourse to chloroform with the attending inconvenience to the hospital service, or we have recourse to local anesthesia by means of ethyl chlorid which is an absolutely inadequate anesthesia, far from solving the problem.

In these cases I believe it to be the duty of the surgeon to take advantage of the precious aid afforded by the inhalation of ethyl chlorid.

The inhalations should be continued to surgical narcosis, in order to obtain the most complete results. For this purpose there have been suggested numerous appliances and arrangements such as the special masks of Billeter and of Brodtbeck, of v. Hacker, of Koenig, of Dumont-Doyen, of Pollosson, and of Mirschler. Without resorting to such helps, I have used with good results the small ordinary mask of Esmarch, duly modified, and I have not recorded a single failure.

METHOD OF ADMINISTRATION.

In the middle of a square piece of waterproof cloth (25 cm. side) I make a hole having the size of a two-cent coin and I introduce into the hole a small ball of cotton or gauze. I place the waterproof cloth on the Esmarch mask in such a way as upon the mask being placed on the patient's face, the latter cannot but breath through the cotton ball. Strictly speaking, one might dispense with the Esmarch mask and directly apply oilcloth on the face, but the direct contact of liquid ethyl chlorid with the lips and the nostrils is painful and irritating. Before applying the mask I pour on the small cotton ball the contents of one-half phial of kelene and when the ball appears entirely covered with icicles and sufficiently impregnated with the anesthetic, I apply the mask on the face of the patient, seeing to it that the margins of the oilcloth projecting from the Esmarch cage are properly fitted on the contour of the face. I ask the patient to inhale deeply while I continue to direct a thin stream of ethyl chlorid on the cotton ball. Narcosis is a question of a few seconds. Sometimes the patient falls asleep immediately; sometimes he is agitated for 5 or 10 seconds; then narcosis sets in. The face is slightly overflushed; the breathing is deep and quiet; the pulse is rythmic and full. The pupil is only slightly midriatic (dilated). The muscular relaxation is complete; the reflexes are abolished. On an average it is sufficient to administer from 1 to 3 cm. per minute in order to obtain a perfect and lasting anesthesia without any untoward occurrence and without the smallest alarm,

If mydriosis (pupil dilation) were to become accentuated, the inhalations should be suspended (*Phocas. Therap. chirurgicale et clinique journaliere,* 1901). I say if it were to become pronounced because in all the numerous ethyl chlorid anesthesias I have practised I have never had to suspend the inhalations due to any unfavorable symptoms.

RECOVERY.

After the surgical operation is terminated, the mask is removed and the patient, in a period ranging from 10 seconds to 30 seconds, awakens, generally all of a sudden, as if he was awakening from natural sleep and it looks as if intoxicated. He is smiling, loquacious, playful and happy. His ideas are still confused and rather disconnected. A minute more and he has completely recovered without a single inconvenience, without any discomfort. He can raise himself, walk and attend to his customary pursuits, but it is my custom to keep patients in bed for at least two hours as a precaution.

It happens sometimes, but rather seldom, that patients do not lose consciousness entirely during the narcosis, but continues during the entire time to grumble words, to argue, to sing in a state of drowsiness, the substance of their ejaculations being very hilarious and pleasant. Upon their awaking the patients have no recollection of what has happened, or at the most, a twilight recollection.

POSTOPERATIVE EFFECTS.

It has been maintained that ethyl chlorid exercises an influence on the heart, the kidneys and on the hepatic cell. Jacobin (*Progres medical Belge,*

1901) points to the possibility of gastro-intestinal troubles as its aftermath. There is no doubt that like all anesthetics in general, this anesthetic, too, may react unfavorably, especially if the inhalation lasts for a long time, on the action of the heart and on the action of the emunctory organs, but these dangers are absolutely like those encountered when other anesthesias are resorted to. We can even state that since the action of the ethyl chlorid is characterized by its transiency, it is clear that this anesthetic should prove less injurious than the other anesthetics. Furthermore, taking into consideration the fact that in war surgery the patients operated upon are strong and healthy young men, no importance should be attached to the objection thus raised, so that Wiesner prefers kelene to ether and to chloroform even for long operations, and Severeanue (*XIII. Congr. Internaz. de Med. Chir. Gen. Paris,* 1900) declares that he is thoroughly convinced of the harmlessness of ethyl chlorid. Similar conclusions have been reached by means of the experimental researches carried out by Flourens (1851) on dogs; by Wood, Cerna (1892) and Ruegg (1898) on rabbits and dogs; by Koenig (1900) on rabbits and monkeys; by Lebst (1900) on frogs and rabbits; and by Girard (1902) on cats, dogs, rabbits, rats and guinea pigs.

Cassanello states that he has never discovered any injurious effects on the kidneys, even in the case of patients suffering from kidney disease.

More numerous are the observations made by Girard. The latter, in a total of 2,000 cases of general ethyl chlorid anesthesia has not had to record a single death, and he is thereby led to make the statement that neither age nor sex, nor the seriousness of the disease, nor alcoholic intoxications, but only the condition of the kidneys may contraindicate the use of kelene.

As far as I am concerned, both on the firing line and in my present service, I have adopted the routine use of ethyl chlorid anesthesia in short operations. I have resorted to it in more than 500 cases and never in a single case have I had to repent of having done so, but invariably I have been led to place still greater confidence in the method, and this enthusiasm of mine for ethyl chlorid narcosis is shared by the very patients in my district. Now the patients themselves request me to resort to this anesthesia for the operation I have to perform on them. They advance this request after they have witnessed the results obtained on their fellow-patients and they are keen in advising their friends, about to submit to an operation, to have the operator resort to this kind of anesthesia.

As I have stated above, I have never had to record the slightest unfavorable occurrence. I have not had a single case where the narcosis proved either a total or even a partial failure.

Out of 100 cases, where in order to watch the operation of the kidneys I have carried out before and after the operation an examination of urine, only in two cases have I noticed a slight transitory albuminuria, and even in five cases in which the function of the kidneys before the narcosis appeared slightly abnormal, I failed to notice any change for the worse in the condition of the kidneys, according to the observations made by Cassanello.

If this short communication of mine will lead other surgeons to routinely employ ethyl chlorid anesthesia I shall feel satisfied that I have done something to better both the surgery of war and of civil life.

INDUCTION OF ANESTHESIA AND ANALGESIA BY ORAL ADMINISTRATION OF VARIOUS DRUGS WITH A REPORT OF CASES.*

A. Ficklen, M.D.,
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The problem of dressing extensive wounds has always presented difficulties to the surgeon. He must be thorough, but he hesitates to inflict great pain on the patient. Morphin, ether, chloroform and nitrous oxid have all been used to lessen the ordeal, but each has its disadvantages. Morphin is not sufficient; ether by inhalation causes nausea and is regarded with dread by most patients who have taken it before; chloroform is dangerous. Nitrous oxid is best, but is not always available.

During the recent war I saw dressing after dressing in which the surgeon took advantage of the stoicism of the soldier and inflicted pain that could have and should have been avoided. The removal of packs, the changing of splints, the manipulation of infected joints:—the wounded man feared these more than he had feared the charge of the enemy. When the intoxication of battle had passed, gentleness in handling the casualties became more necessary than ever, but care, hypodermics, and irrigation of bandages beforehand all failed only too often. For this reason I welcomed an article which appeared in the May number of the bulletin of the American Red Cross, on analgesia by oral administration. I found later that this was condensed from a report in the *British Medical Jour-*

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*Read before the American Association of Anesthetists, during the Eighth Annual Meeting, Hotel Grunewald, New Orleans April 26-27, 1920.

nal of March 2, 1918, by Dr. James T. Gwathmey of New York, and Dr. Howard Karsner of Cleveland. The *Journal of the A. M. A.* of April 6, 1918, also prints this most interesting analysis of experiments on animals, and results in clinical cases.

EXPERIMENTAL DATA.

As this is primarily a summary of experiences with the method I will not go deeply into the animal experiments. Suffice it to say that various drugs were given to rabbits by stomach tube and that 50 per cent. ether in olive oil was found to produce the desired effect. The olive oil, however, caused an acute gastritis in rabbits, so liquid petrolatum or Russian mineral oil was substituted. Quinine and urea hydrochloride, trional, morphin tartrate, and paraldehyde were all tested, but the results did not warrant use in man. The fact that ether drinkers suffer no more than alcoholics from gastric irritation and that "a 65 per cent. solution of ether in oil has been used in many thousands of cases of ether-oil colonic anesthesia without any signs of local irritation to rectum or colon" reassured the authors.

The following formulas were used clinically:

Formula 1—Ether 4 fluid drams,
Liquid Petrolatum 4 fluid drams,
Peppermint water 5 minims.
Formula 2—Paraldehyde 1 to 3 fluid drams,
Ether and liquid petrolatum equal parts to make 1 ounce,
Peppermint water 5 minims.
Formula 3—Ether 3½ fluid drams,
Liquid Petrolatum 4 fluid drams,
Peppermint water 5 minims.
Formula 4—Chloroform ½ to 1 fluid drams,
Ether 3½ fluid drams,
Liquid Petrolatum 3½ fluid drams,
Peppermint water 5 minims.

METHOD OF ADMINISTRATION.

The authors recommend, at the suggestion of Major Lower, that port wine be given before and after the dose. They state that rinsing the mouth thoroughly with the wine disguises the taste of the drug effectively. Our medical supplies did not include port, so I substituted undiluted whiskey. Probably yerba santa could be used to better advantage. The taste of Formula 4, as I know from experience, while pungent, is not as unpleasant as that of castor oil.

Approximately sixteen cases are reported in most of which ether liquid petrolatum was given. One vomited, three fell into a light sleep. The administration of a half dose gave unsatisfactory results. Extensive dressings were done without pain, the patients had no headache and woke with good appetites. The authors also mentioned that Formula 4 was given in approximately thirty cases, and that it is a more satisfactory mixture than the others. Detailed case reports, however, are not presented.

Ether-oil by mouth was also used as a supplement to chloroform anesthesia. An extensive operation on the knee joint was performed in this way with the use of only two drams of chloroform.

Since the literature on this subject is so scanty at present, I wrote to Dr. Gwathmey asking if his subsequent experiences had caused him to modify his opinion in any way. I quote from his reply:

"In addition to the inclosed (a reprint from the *British Medical Journal*) I finally used this formula quite frequently:

Chloroform drams 2,
Ether drams 2,
Liquid paraffin 4 to 6 drams,
Peppermint water 5 minims.

If the dressing was very painful I used in connection with this morphin sulphate, grain ¼ to ⅜, by hypo, one-half to three-fourth hours before. With this combination there was no question about the analgesia. Operations with this combination were not entirely successful. I may add that three of the officers and myself took Formula 1 immediately after a very hearty meal, and as a liqueur, and with no bad effects whatever . . . . and with analgesia, so it seemed to us."

Gwathmey's recent experiments have demonstrated that chloroform given by mouth has dangers. Until his report appears I am not at liberty to go into details.

CLINICAL PHENOMENA.

Approximately half of the patients had a short stage of excitement manifested by restless movements and loud talking. This lasted from three to five minutes and was succeeded by deep sleep and complete muscular relaxation. The pulse was full and bounding and ranged from 80 to 100. Many of the patients fell asleep in five minutes and did not rouse for several hours. The face was slightly flushed or normal in color. Dressing was started in from 5 to 25 minutes. In about one-third of the cases the breathing was deep and stertorous, in the rest it was slow and regular but not snoring. Two of forty personal cases did not sleep but had pronounced analgesia. On questioning these two the next day I found that they had little recollection of pain. This is parallel to the loss of memory following morphin-scopolamin administration. In particularly extensive wounds and twenty minutes before operation, I gave a hypodermic of morphin, grain 1/6. This is a useful adjuvant but is not absolutely necessary. Gwathmey and Karsner state that their patients fell into a light sleep. Most of my cases slept profoundly and many of them gave absolutely no signs of pain during the removal of tight packs or the changing of splints. This is due to the fact that I used the following prescription, taken from the American Red Cross bulletin:

Formula 5—Chloroform 5 c. c.
Ether and Liquid petrolatum, each 20 c. c.

With this prescription, which is obviously more powerful than ether-oil, I estimated that the maximum effects lasted from one-half to three-fourths of an hour. After an hour the patient rouses easily. Groaning was noted occasionally but had no significance. I did not test the total duration of analgesia, which probably persisted from some time after the anesthesia had worn off. Most cases slept for two or three hours and one as long as five hours. All were drowsy even though they were able to answer questions. Four or five complained of the taste of the mixture but were willing to take it again for its effect. This is the usual attitude of human beings towards intoxicants.

CASE REPORTS.

The following case reports will give a more vivid idea of the results obtained:

Case 1.—S. C., aged 23, weight approximately 150 lbs., gunshot wound, high explosive, right frontal and parietal region, extensive comminution skull, loss of brain substance and avulsion eye-ball. Debridement and packing extending deep into cranial cavity. Oral anesthesia third day. Five minutes after administration patient made a few restless motions and breathing became stertorous. He did not respond to questions. The bandages were cut and the edge of the pack cautiously retracted. The patient did not move. This was my initial case and I proceeded cautiously at first, but grew bolder as I approached the depths of the wound. The pack was removed, fresh gauze placed in the orbit and into the gaping cavity in the skull. The patient showed absolutely no signs of discomfort. He slept all the rest of the afternoon, about three hours, and had to be awakened for supper. Two days later the dressing was repeated with the same technic and the same result. He was then evacuated but I was fortunate enough to see him up and around six weeks later at Base Hospital 24.

Case 2.—J. D., aged 24, weight 145, hemolytic streptococcus infection left knee following injury in R. R. accident. Dressings in this case necessitated flexion of the joint and were extremely painful. Oral anesthesia was used on seven different occasions. Unconsciousness always followed within 15 minutes. Drains were removed, splints changed and new tubes inserted with no sensation on the part of the patient. There were no after effects whatever. The patient asked for the mixture. He remained six weeks in the hospital and was evacuated much improved. The septic process had been arrested and he had gained materially in weight. This case shows that the ether and chloroform mixture may be given repeatedly without deleterious effects.

Case 3.—H. G., aged 20, weight 130, intensely nervous, circular amputation upper third leg for mixed infection hemolytic streptococcus and B. Welchii, cuff of skin turned up, flaps left unsutured, oral anesthesia, third day after operation. Patient groaned and complained in a low voice during dressings, answers to questions were vague. Had almost no memory of dressings and no recollections of pain afterwards. This case hovered on the border line between analgesia and anesthesia.

The following case shows the advantage of ether chloroform by mouth as a supplement to ether by inhalation:

Case 4.—P. G., aged 20, weight approximately 120, gun-shot wound, right ankle, hemolytic streptococcus infection, compound comminuted fracture tarsus, amputation decided on in consultation with the chief of surgical service. Oral anesthesia in ward. After 15 minutes patient carried to operating room, splint removed, leg shaved and washed thoroughly. Patient slept tranquilly. Ether drop method started during applications of iodin and incision made after a few c. c. had been poured on mask. A modified circular amputation was done with suture of the flaps. At the conclusion of operation it was found that only 90 grams of ether had been used. The patient did not vomit and slept for three hours afterwards.

Case 5.—One-half the normal dose was given to this patient. He entered the hospital profoundly septic. His weight was about 70 lbs, and recovery was obviously impossible. He complained bitterly during the dressing, was wide awake and seemed to have no analgesia whatever. He slept for two hours afterwards and did not vomit. 10 c. c. of ether and 2½ c. c. of chloroform was apparently too little.

CASE 6.—S. G., aged 21, weight approximately 100. Empyema following pneumonia. General condition bad. Ether-chloroform given on operating table. Asleep in 10 minutes. Two syringefuls ¼ per cent. novocain injected into chest wall. Resection one inch 5th rib mid-axillary line. Patient did not complain but coughed when pleura was opened. Drainage tubes inserted, binder applied, and patient returned to ward sleeping. Apparently little shock.

The above illustrate the different types of reaction to the drugs. One case vomited almost immediately after swallowing the mixture, and Dr. Philip Carter reported a similar occurrence. The undiluted whiskey was perhaps to blame. Dr. Lacroix used the method on four or five patients with most satisfactory results.

ADDITIONAL CASE REPORTS AND CONCLUSIONS.

Since my preliminary report to the Orleans Parish Medical Society, I have been able to collect several cases from the practice of my confreres and myself in which this analgesia has been used. As most of them only bear out the conclusions already reached, it will not be necessary to report them in detail. Two of the cases differ from the other enough to deserve mention.

CASE 7.—In the first, a boy of 14 years, weight about 90 pounds, was skin grafted over an area approximately three by four inches and there were absolutely no pain sensations. The analgesia lasted for an hour, and anesthesia the same length of time. As soon as the skin grafting was finished a stomach tube was passed and the gastric contents withdrawn. A distinct film of the oil, smelling strongly of ether, appeared in the pan showing that total absorption had not taken place in three-quarters of an hour. Washing out the stomach evidently shortened the analgesia considerably. He was not nauseated but had a slight headache; there were no changes in the urine.

CASE 8.—Another boy, aged 12, was given the full dose for an adult. An oblique fracture of the tibia was reduced as easily as though he had taken ether by inhalation. This boy had eaten breakfast a short time before. He was quite nauseated on regaining consciousness and vomited several times that evening and that night. The analgesia increased steadily for fifteen minutes after he had fallen asleep. The pain reflexes were distinctly delayed. Analgesia lasted two hours and fifteen minutes, and anesthesia about one hour and a half.

I feel justified in presenting the following additional conclusions in regard to the administration of oil, ether and chloroform by mouth:

1. In default of Port wine, syrup of yerba santa in one dram doses disguises the taste fairly well.
2. If the body weight is less than one hundred pounds analgesia, followed by narcosis, results.

VARYING REACTIONS.

In adults, however, varying reactions are noted, ranging from slight analgesia to pronounced narcosis, but never reaching the stage of complete abolition of reflexes. The pharyngeal reflex, for instance, is always persistent. The youngest patient in my series was twelve years old. I should hesitate to give the full dose to a child of ten. Too few obstetrical cases have been observed to formulate definite conclusions, but we can undoubtedly diminish the pains of labor by the use of this method, and if the drugs are given near the conclusion of the second stage, without danger to mother or child. A preliminary purgative and an empty stomach practically eliminate nausea.

It is realized that the usual dosage of chloroform given internally, stated to be from five to ten minims, has been much exceeded. Chloroform causes a sensation of heat and burning in the stomach and is absorbed rapidly when given undiluted. Its fate in the body is unknown, except that a certain proportion is excreted unchanged by the lungs. Corner in the *Clinical Journal*, May, 1912, states "that the anesthetic in part is excreted into the alimentary canal and reabsorbed from it, therefore it matters little if the drug is swallowed or absorbed from the lungs."

Sudden death from chloroform, which is supposedly due to reflex cardiac inhibition through irritation of the trigeminal terminals in the upper respiratory passage and transmission of the impulses to the vagi, is not likely in these cases. Fear, struggling, shock, pain and extreme youth, which are regarded as being predisposing causes of the acute form of poisoning, are evidently not factors that need be considered in this connection. I watched closely for symptoms of delayed chloroform poisoning. The cerebral irritation, the waxy skin followed by jaundice, the nausea and vomiting, the fever, the pain referred to the right shoulder, the liver tenderness and the collapse which characterize this most serious complication have not resulted so far from the 5 c.c. doses administered. However, further observation is certainly necessary, as one such case would condemn the procedure and force us to use simply ether and oil.

The text book dosage of ether given as from ten to sixty minims has also been much exceeded. Nicloux has shown that in dogs the percentage of anesthetic in the blood in deep narcosis is .05 for chloroform and .13 to .14 for ether. We may assume that the predominant symptoms in these cases are due to ether and that the chloroform simply prolongs and intensifies the ether effects. Full bounding pulse, the frequency of strong, regular respiration and the preliminary excitation are typical of ether and not of chloroform. Since the percentage of concentration determined by Nicloux would not be approached even if immediate complete absorption took place, and it has been definitely proved that it does not, we may be fairly certain that we are below the toxic limit.

Lastly, several of my colleagues have asked me how the effect of these drugs can be controlled once they have entered the stomach. Gastric lavage combined with the accepted methods of treating poisoning by anesthetics would seem the best solution. So far the entire absence of alarming symptoms has rendered such a course unnecessary.

ORAL ANALGESIA IN LABOR.

I have also been able to collect seven cases in which the ether-chloroform mixture was used in obstetrics. These cases will be reported in detail. Briefly they showed varying degrees of analgesia and light anesthesia. The mixture does not seem to diminish the contractions of the uterus, even when the patients were asleep. In my two personal cases I could see no effect on the child. In one case massage of the uterus was necessary for a slight hemorrhage, but it would be unfair to ascribe this entirely to the drugs given, as it occurs so frequently when there has been no medication. I have used the syrup of yerba santa in one dram doses and it apparently disguised the burning taste to a certain extent, but does not abolish it entirely. In one case, though a perineorraphy was not necessary, I feel sure from other tests that there was sufficient analgesia for this operation.

One case showed a pronounced stage of excitement; in two there was analgesia plus narcosis, and in the rest varying degrees of analgesia. The uterine contractions were not diminished in force or frequency. One of my patients stated that she felt complete relief from an agonizing pain in the sacral region and that the bearing down pains were much relieved. Drs. Newman and Levy are inclined to believe that administration during the first stage is advisable, but my efforts have been to diminish the suffering of the latter part of the second stage. One of Dr. Newman's case reports notes that the baby was born thoroughly anesthetized. It survived and showed no ill effects. The mixture had been given about two hours before birth.

The summary which follows represents the conclusions formed after observation of about forty-five patients. As record keeping was impossible during part of the time, I have underestimated rather than overestimated the number seen personally, judged to be forty.

SUMMARY.

Ether chloroform and liquid petrolatum when swallowed in the quantities stated produce a safe general analgesia, accompanied in nearly all cases by light anesthesia.

Vomiting occurs in a small proportion of cases.

Alarming symptoms have never been observed.

The effects of the drugs are intensified and prolonged by the administration of morphin.

The ether oil mixture is not as powerful as the formula to which chloroform has been added. This conclusion is reached by comparing the case reports of Drs. Gwathmey and Karsner with my own.

The field of usefulness of the procedure should be broadened. Enough cases have already been observed to show that it is of value in painful dressings and as a supplement to general anesthesia. It has not been used, as far as I have been able to ascertain, in gynecological examinations where relaxation is necessary, in suspected malingering, and in manipulation of ankylosed joints.

Since the method is yet in its infancy, further tests should be made to determine its status in surgery, and the above suggestions are made with this in view.

I am indebted to Dr. Gwathmey for the interest he has taken in this report.

621 Macheca Bldg.

THE AMERICAN ASSOCIATION OF ANESTHETISTS WILL MEET IN BOSTON, JUNE 6-7, 1921, THE FIRST TWO DAYS OF A. M. A. WEEK. THIS—THE FIRST ANESTHETIC RALLY EVER HELD IN THE NORTHEAST—WILL BE THE NINTH ANNUAL MEETING OF THE ASSOCIATION AND IT IS HOPED THAT NEW ENGLAND ANESTHETISTS WILL CO-OPERATE IN MAKING THIS MEETING A BIG SUCCESS. THERE ARE MANY NEW ENGLAND ANESTHETISTS WHO ARE NOT MEMBERS OF THE A. A. A. AND THESE SHOULD JOIN AT ONCE AND HELP IN PROMOTING THE INTERESTS OF THEIR SPECIALTY.

UNDOUBTEDLY SOME OF THESE ANESTHETISTS HAVE BEEN MAKING INTERESTING AND VALUABLE RESEARCHES AND CLINICAL OBSERVATIONS. BY ALL MEANS THEY SHOULD PREPARE PAPERS ABOUT THEIR LATEST ACHIEVEMENTS AND REQUEST A PLACE ON THE PROGRAM FOR PRESENTING THEIR CONTRIBUTIONS.

GENERAL ANESTHETICS FOR INTRA-ORAL OPERATIONS.*

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There are many factors in the administration of anesthetics for intra-oral surgery which make the technic one of the most difficult to be attained.

DIFFICULTIES.

The obvious necessity of administering the anesthetic with the mouth open causes a radical departure from the closed and semi-closed methods. The vapor or gases must be sufficiently rich and under pressure to force out the atmospheric air from the pharynx.

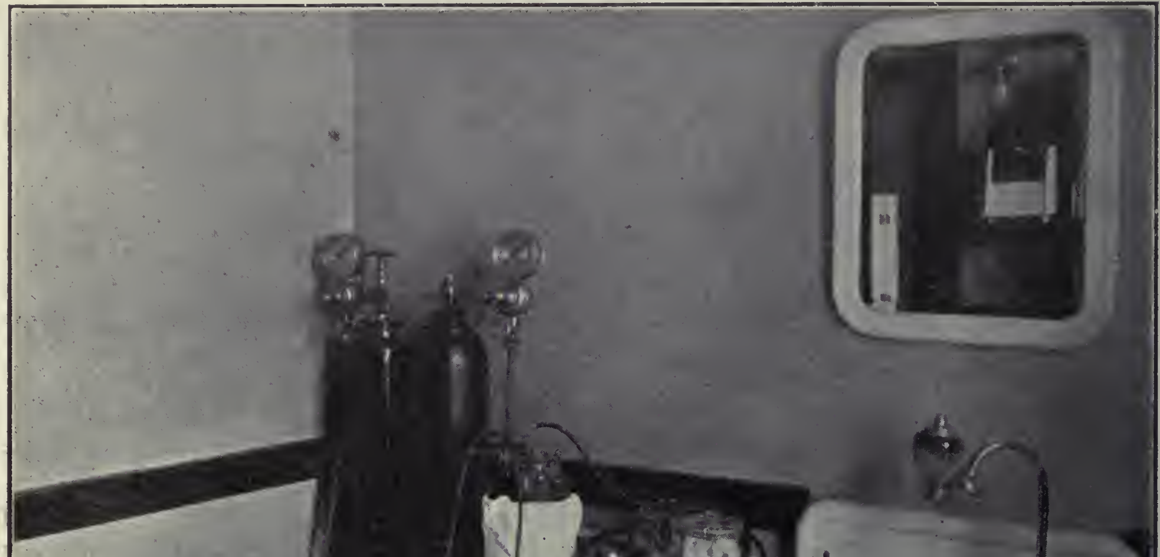

Fig. 1—Anesthetic and emergency equipment.

The small field of operation in which the anesthetist, operator and assistant have to work, makes the administration much more difficult than if the anesthetist had the whole head to himself. The unavoidable hemorrhage complicates the administration and requires supervision and cooperation with the operator's assistant, whose duty it is to keep the blood and mucous aspirated from the pharynx. The forcing down of the jaw during the operation interferes with the respiration and is another point for the anesthetist to watch. It can readily be seen that the successful administration can be attained only by the closest observation and cooperation of every one concerned, and the checking up of each other during the operation.

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*Read before the Section on Anesthesia for Dentistry and Oral Surgery of the Interstate Association of Anesthetists, during the Sixth Annual Meeting, at Cincinnati, Ohio, September 15-17, 1919.

CHOICE OF THE ANESTHETIC AND POSTURE.

The choice of the anesthetic depends primarily upon the patient's physical condition, and secondarily upon the individual anesthetist. Chloroform produces a beautiful anesthetic for mouth work, but the high mortality and frequent postoperative complications contraindicate its use. The committee on anesthetics appointed by the American Medical Society, in 1912, reported the use of chloroform as an anesthetic as no longer justifiable, and that for minor operations its use should cease.

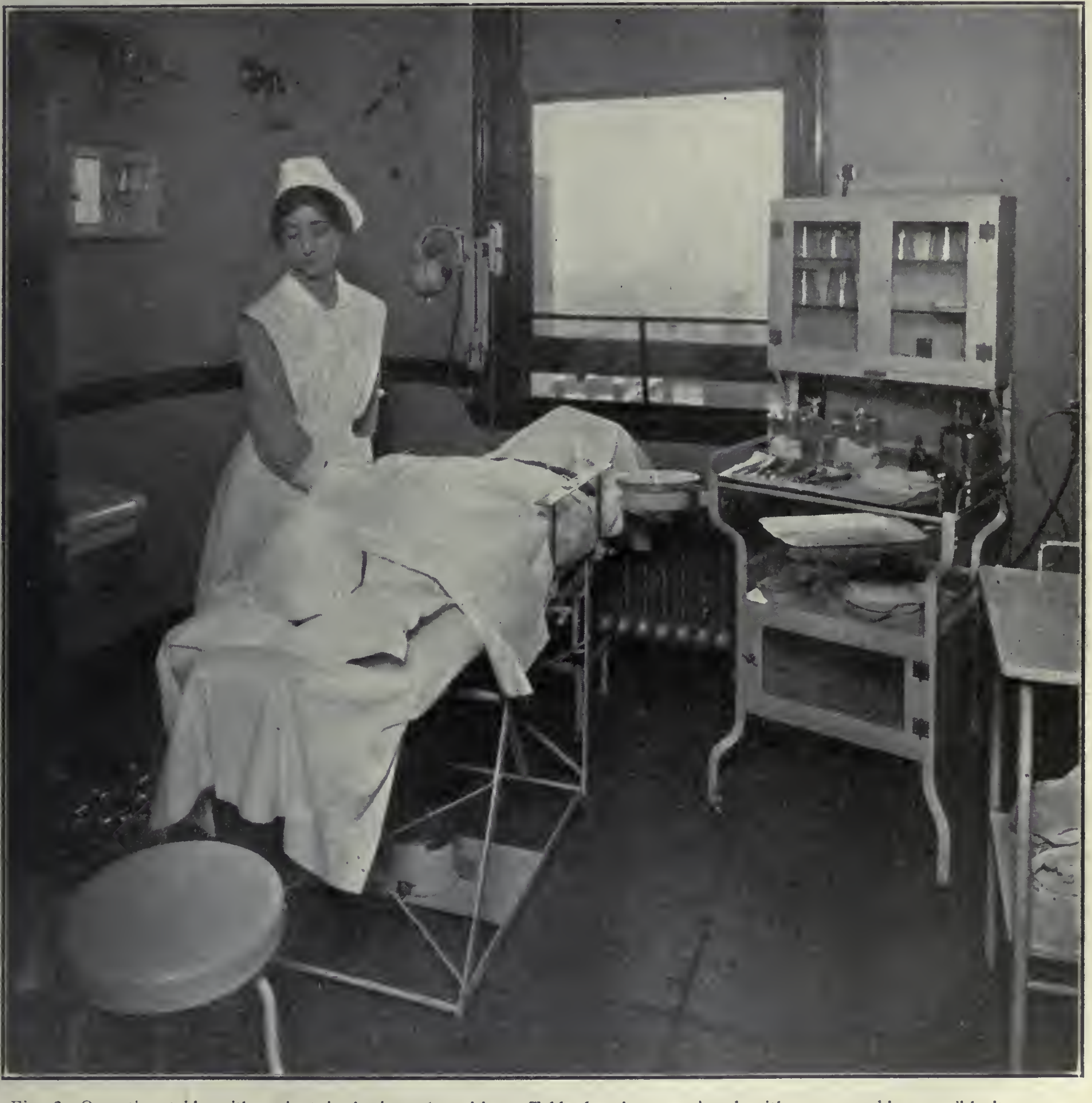

Fig. 2—Operating table with patient in horizontal position. Table has been equipped with arms, making possible its use as a treatment chair in any position. It has been lowered six inches which allows operator to be seated if desired. Strap is placed just above knees, and cuffs which are attached to table are placed on wrists.

N_2O-O and ether, alone or in combination, are the anesthetics of choice. Nitrous oxid-oxygen used with the nasal inhaler, is ideal for short operations. In long operations, especially when the nasal fossæ or antrum are opened, it is necessary to use ether in combination with the gases. This is administered best by the ether attachment on the gas machine. For resection of the jaw, removal of large cysts of the ramus, resection of nerves and any operation involving the tongue, the writer prefers the ether vapor by the intrapharyngeal method. The vapor can be controlled much more easily, due to the air dilution from mouth breathing.

For any operation in the mouth, including the extraction of teeth, where a general anesthetic is indicated, the dental chair is replaced by an operating table. By this method the head can be placed in any position suitable to the operator and the anestheist has a better view of the patient and reflexes. Should the patient become hard to manage during the anesthetic, he can be restrained easily. The lower jaw can be held forward, which sustains an open airway. If a tooth is accidentally lost from the forceps it is less liable to enter the larynx. When the proper aspirator is used and the throat is packed, there is as little danger of blood being aspirated into the bronchi as when the sitting position is used. The circulation is much better as is the respiration. Due to this fact there is less danger of cerebral anemia.

It is a fact that N_2O has been given thousands of times by dentists without a physical examination or taking of blood pressure. While this fact proves the safety of the anesthetic, it does not justify the practice.

PRELIMINARIES.

In preparing a patient for a short operation it is advisable that the stomach and bladder be emptied and all tight clothing loosened or removed, the latter being the duty of the assistant. All emergency and anesthetic equipment are in proper place before the patient is brought into the operating room. After the operating table is in position and the patient instructed in breathing through the nose with the mouth open, the mouth-gag is placed in position, the nasal inhaler adjusted and the niterous oxid turned on. After the patient is under the influence of the anesthetic, the back of the mouth is packed with gauze and the operation begun. Enough pressure must be present to force the gases into the post-nasal pharynx.

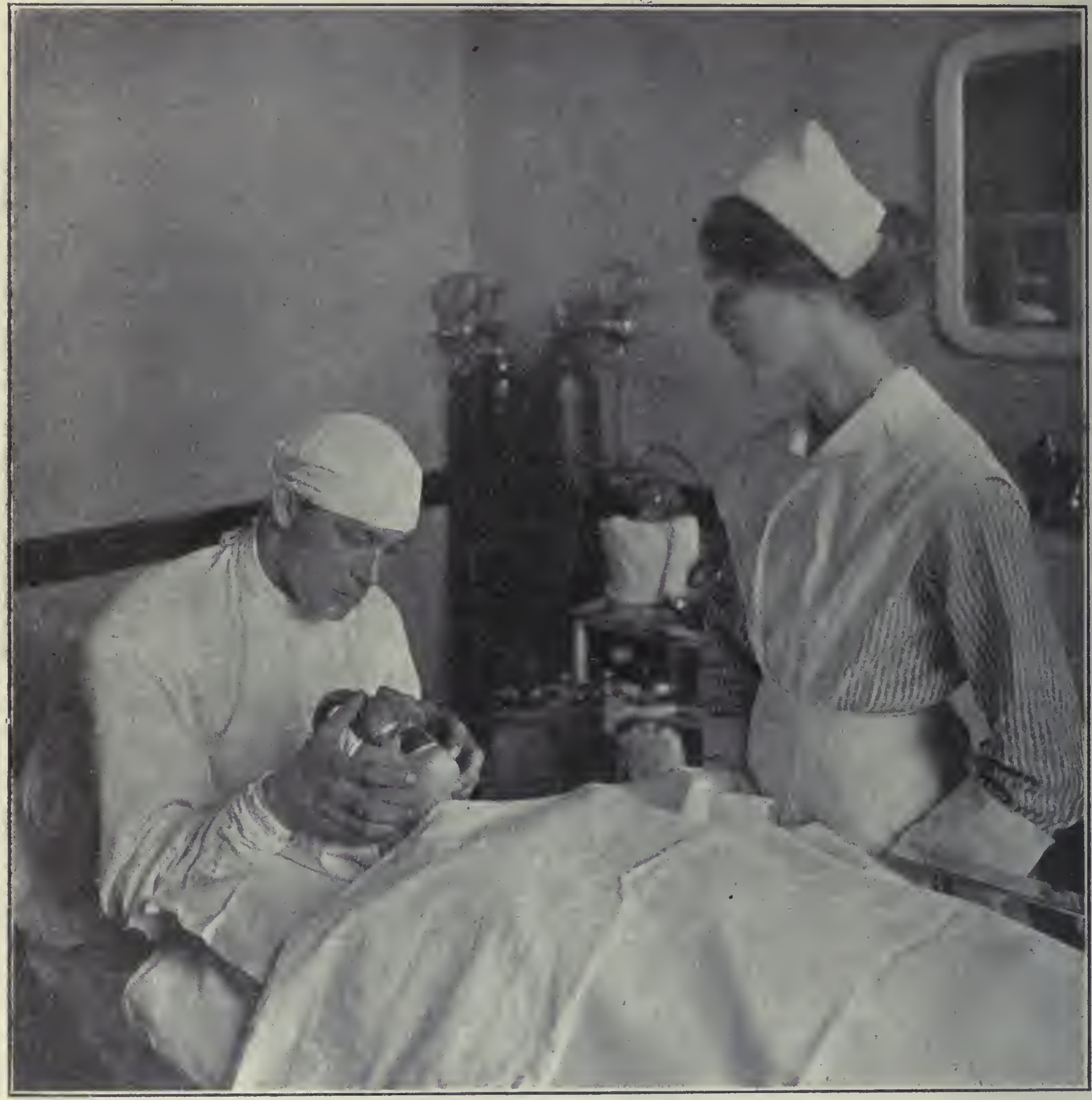

Fig. 3—Nasal inhaler in place. All anesthetic equipments on left side of table.

For a long operation the patient is prepared as though it were a laparotomy. There must be an examination of the heart and lungs and if ether is to be used, a urine analysis. This should be routine work as no one can prognosticate the outcome of an anesthetic. If the anesthetist is a dentist and not qualified to make these examinations, the patient should be sent to some one who has the proper qualifications. The patient usually comes into the hospital the night before the operation, when a light meal is allowed, followed by a cathartic. An enema is given on the morning of the operation. By following this rule you are positive of the patient's diet and run no risk of vomiting which retards the anesthetic and may be inspired by the bronchii causing complications. The patient is brought into the operating room in an operating gown. The anesthetist is sterile, as is the operator. When ether is to be used no premedication is necessary; but when N_2O-O alone is to be used, an H. M. C. tablet is given one-half hour before the anesthetic.

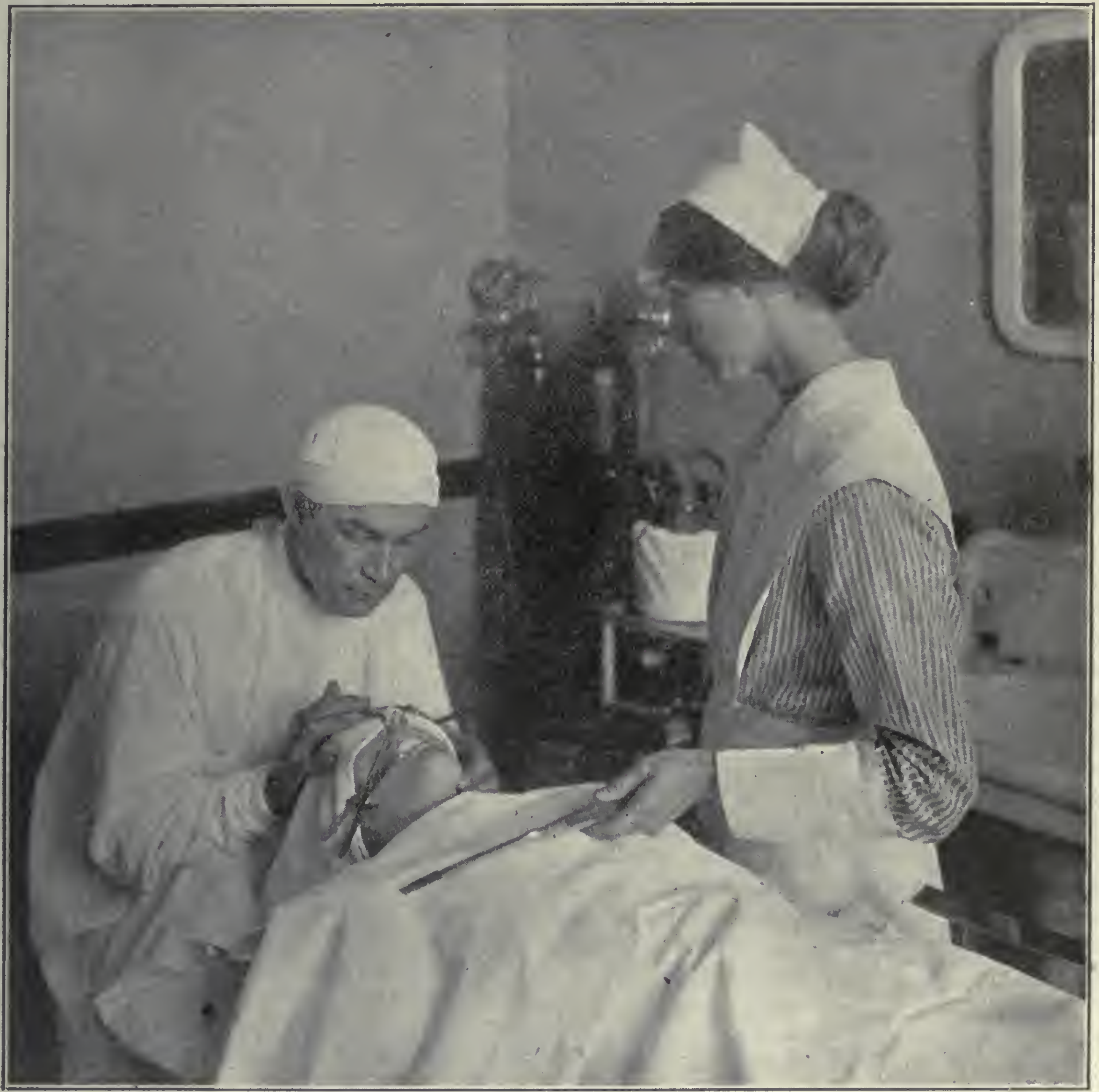

Fig. 4—Nasal tubes in place with back of mouth packed with gauze. Position of nurse who keeps blood aspirated from the field of operation, is at the left of the anesthetist.

When intrapharyngeal anesthesia by the vapor method is indicated, N_2O-O ether is given as a sequence. A surgical plane of anesthesia must be induced before the catheters, which are moistened with sterile water or vaseline, are introduced into the post-nasal pharynx. A good rule given by Conell is that the length of the catheters is equal to the distance between the alae of the nose and the auditory meatus. Care should be taken that this rule is observed or the vapor will enter the esophagus and dilate the stomach and the patient will come out of the anesthetic.

ANESTHETIST AND OPERATOR?

No dentist or surgeon should act as both anesthetist and operator, and he who does so is not giving his patient the maximum of safety. Even if the anesthetic is to be what seems a simple extraction, this should be done in a surgical-like manner; not destroying bone and tissue because of the limited time the patient can be kept under the anesthetic. We are removing roots of teeth and necrosed bone due indirectly to the limited time that the operator has had for work. The majority of extractions are devitalized teeth which are very brittle and apt to break. This often necessitates a resection of the buccal plate of the jaw in order to remove them properly. This requires time and undivided attention. A dentist giving N_2O-O for an extraction, even with the assistance of a competent nurse who is not a trained anesthetist, can not give his undivided attention to the operation. If complications arise during the operation, caused by a poorly-administered anesthetic, the operation is generally a failure, which could have been prevented by the employment of a skillful anesthetist.

SURROUNDINGS AND EQUIPMENT.

The use of suggestion at the proper time is a great factor in the successful administration of anesthetics. Few indeed are the people who are not nervous and apprehensive when the necessity for an anesthetic actually arises. One of the duties of the successful anesthetist is to allay these fears. The assistant can do much by her manner to inspire confidence. Every thing must be matter of fact with no loud talking, whispering or professional discussion by those in attendance. No straps are placed on the patient before he is anesthetized, when a strap is placed just above the knees, and cuffs which are attached to the table are placed on the wrists to keep the arms from dropping over the sides of the table which may cause a possible pressure paralysis.

It is difficult to administer anesthetics in a hospital which has no special anesthetic equipment. It has been the practice of some dentists to send their patients to the hospital for the removal of impacted teeth under ether. The open method is used, the operator working as long as he can before the patient comes out of the anesthetic, when he is immediately resaturated. This is poor practice as it requires twice the time and anesthetic to do the same amount of work. N_2O-O by the nasal method, or the intrapharyngeal method with ether is indicated.

When there is a question as to the depth of the anesthetic or as to the condition of the patient, give the patient the benefit of the doubt and stop the administration.

Everybody who is giving anesthetics should have all emergency equipment in working order at all times; for in case of accident, providing the anesthetic was properly administered, the anesthetist will not hold himself responsible.

Anesthesia is an art which can be mastered only by special study and each anesthesia should bring one nearer to the high ideal toward which he is working.

UNION CENTRAL BUILDING.

REMARKS ON COTTON PROCESS ETHER FROM PERSONAL EXPERIENCE AND THE REPORTS OF OTHER OBSERVERS.*

JOS. E. LUMBARD, M.D.,
NEW YORK CITY.

My attention was first called to the work done on ether by Dr. James Cotton, of McGill University, Canada, through his demonstration and lecture at the Royal Victoria Hospital on June 14, 1917. This was properly vouched for and reported in the Journal of the Canadian Medical Association for September, 1917.

COTTON'S CLAIMS FOR HIS NEW PROCESS ETHER.

Briefly, Cotton claims to have discovered that if ether is thoroughly purified by means of a new condensation process he has devised, instead of the older method of fractional distillation, it loses its power to produce anesthesia and becomes merely a stimulant narcotic, somewhat similar in its effects and actions to alcohol. This loss or absence of anesthetic power must therefore be ascribed to something which has been eliminated from the ether during the process of purification. Conversely the anesthetic virtues of ordinary anesthetic ether must depend upon the presence of one or more of these abstracted substances.

Cotton claims, in fact, that two classes of extraneous substances are present in anesthetic ethers. One class, which are desirable, and which favor the production and the maintenance of anesthesia, are really *synergists;* while the others are undesirable *chemical impurities,* which cause postoperative nausea, irritation of the respiratory tract and other untoward symptoms commonly designated as "ether sickness."

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*Read before the American Association of Anesthetists, during the Eighth Annual Meeting, Hotel Grunewald, New Orleans, April 26-27, 1920.

The truth or fallacy of Cotton's theories can readily be demonstrated by anyone with the necessary experimental laboratory facilities and a sample of Cotton's purified ether (procurable on request). The anesthetist is hardly the one to test out this phase of the controversy on the subject. However, Cotton's observations on this matter have been corroborated by others and I have had an independent experience along this line myself. I had always been on the lookout for the purest ether obtainable and I finally succeeded in procuring a sample of ether which assayed 99.8 per cent. pure, the remainder being 0.2 per cent. water. To my surprise, at that time, this sample acted upon trial like a very weak ether; it was actually impossible to get a really satisfactory degree of surgical anesthesia with it, in spite of any increased amount administered. The same patients, on whom the pure ether had been used, went under, without difficulty, when a change was made to an ordinary anesthetic ether containing only 96 per cent. ether.

What we anesthetists are after is an ether with enhanced anesthetic power and virtues and not one with any of these qualifications eliminated. If Cotton is correct in his contention, his idea of course opens up the possibility of producing a superior grade of ether by first eliminating all toxic impurities and then by restoring those synergists that favor the production and maintenance of anesthesia.

ETHER ANALGESIA.

What gave Cotton's work more or less of a spectacular aspect was the discovery, as he alleged, that by super-charging the purified ether with the beneficial synergists—ethylene and carbon dioxid, a condition of analgesia, without loss of consciousness can be maintained by the administration of an amount short of that required for surgical anesthesia. It was this ether anelgesia which he demonstrated in several operations upon the occasion previously referred to.

Cotton Process Ether Analgesia is apparently identical with primary anesthesia such as can be obtained with any other anesthetic ether, but it is possible with the new ether to maintain the analgesic state for a much longer time, with the patient fully conscious and with fairly good control of all voluntary muscles. In his experimental work Cotton sought this analgesic property especially as it was hoped it could be used to great advantage in war surgery and would admit of very rapid evacuation of the wounded to the rear even after severe operations. The theory of ether analgesia is based on the fact that on account of the boiling point of absolute ether it is possible to produce an ether-gas-tension in the tissues locally at the point of maximum heat production, which is in the end of the capillaries of the peripheral tissues. An initial vasodilatation caused by the ether allows for a saturation of the tissues while a subsequent vaso-constriction maintains the ether-gas-tension and the analgesia.

These phenomena also account for the stabilization of pulse rate and blood pressure during analgesia and anesthesia under Cotton Process ether. Unless the peripheral sensory nervous mechanism is normal and responsive to the effect of ether, ethylene, carbon dioxid and oxygen, it is difficult to produce and maintain a state of analgesia. Thus it may be difficult to obtain analgesia, (short of narcosis) in patients suffering from anemia, hemorrhage, syphilis and prolonged fever.

I have had very little experience with ether analgesia. I have tried it out in a few cases and my experience has been that of others—some appeared to be quite successful while others passed into surgical anesthesia before any analgesia stage could be demonstrated.

ETHER ANESTHESIA.

The possibilities of Cotton Process ether appeal to me as an improved ether for surgical anesthesia, especially if it would reduce irritation during induction and eliminate postoperative ether sickness—things which all anesthetists are striving for.

In casting up results and adjudging them we must of course distinguish between those postoperative effects which may be due directly to the anesthetic and those due to the operation or the patients' pathological condition. Only an open mind backed with the conservative judgment of considerable anesthetic experience can lead to a reliable verdict, since the distinction is sometimes hard to make for even the most experienced.

PERSONAL EXPERIENCES AND CONCLUSIONS.

I shall give you my impressions of the utility and value of Cotton Process ether from an experience of over 400 cases in which I have used it personally and I shall amplify my views with those of other expert anesthetists of large experience, who have kindly sent me their opinions. You can accept our verdicts for what they are worth.

I used Cotton Process Ether, in a general hospital anesthetic service, by all methods except ether-oil colonic anesthesia. From this use I have drawn the following conclusions.

1. It certainly acts like a stronger ether, at least

during the stage of induction, in which there is apparently less irritation of the mucous membranes and less secretion of mucous. During the stage of maintenance I failed to note any special difference, unless possibly that a slightly smaller amount of ether was used.

2. Recovery seemed less disturbed than when using the ordinary ethers and postanesthetic by-effects were minimized.

I think under the use of Cotton Process ether there is more of a tendency to cyanosis, so that many patients have to be more carefully watched. The lesser irritant effect may be noted especially during the induction of anesthesia in children and also when changing from nitrous oxid to ether.

OPINIONS AND CONCLUSIONS OF OTHERS.

FREEMAN ALLEN, M.D., Boston.—I have been using this ether in *selected cases* for the past two and a half months. The cases I selected were: (1) Children about 10 years old and several infants, about 25 cases in all. The operations were mastoids, hernias, circumcisions and appendectomies. I did not use it in any tonsillectomies or throat work. (2) Gynecological cases and female patients generally, who gave histories of previous postanesthetic nausea and vomiting. Of these there were some 20 cases. (3) I have also used it very often in the ether chamber of the Bennett inhaler simply for inducing anesthesia, changing afterwards to some less expensive ether. Also I have used it in the ether attachment of a nitrous oxid-oxygen apparatus in connection with the administration of gas-oxygen. I have also used it in a few cases of closed ether with the Bennett inhaler throughout.

I have had no experience at all with *analgesia* with this or any other ether, as most of my work is in connection with major surgery.

Making due allowance for the well-known variations in operators, operations, types and conditions of patients, the following impression, based on a small number of cases, is given for any value it may have.

I feel sure that, clinically speaking, it is a superior ether, and that with it I can control patients very easily. I can get along with less of it than with other ethers and in several patients, who, previously had been markedly nauseated with other ethers, the postanesthetic effect of Cotton Process ether has been much less. In children, although I always give atropin first, I find that there is less tendency to mucous secretion and hyperpnea, and that they are readily kept pink. In comparison I would say that from 5 to 6 ounces of Cotton Process ether suffice for the same period of semi-open etherization provided by 8 ounces of other ether.

RAY A. RICE, M.D., Columbus, O.—I have used Cotton Process ether quite extensively by the closed method and think it very good when so given. I do not think it compares with other ethers by the drop-method. It seems to be too gaseous and there is trouble in keeping patients asleep. I have never tried-out its *analgesic* properties, having witnessed an attempted demonstration at another hospital which was quite a failure.

A. S. MCCORMICK, M.D., Akron, O.—I have been keeping some records of the use of various ethers since January. In a series of 106 cases just tabulated, men, women and children patients, operated on, in 5 hospitals, various residences and offices, without selection of cases and working for 37 operators in 27 different kinds of operations, I have found that the average induction time (nitrous oxid-ether and drop-method) to be as follows:

Squibb	6.85 minutes
Cotton Process	3
Mallinckrodt	3.93

The average amounts of the different ethers used for the entire operations were as follows:

Squibb	3.76 ounces
Cotton Process	2.76
Mallinckrodt	2.33

I am sometimes unable to relax certain patients with Squibb's ether and the addition of Cotton Process or Mallinckrodt ether is necessary. I find that a combination of the last two works very nicely in the Ben Morgan apparatus.

Squibb's ether causes considerable mucous secretion in children and also in adults, if no preliminary hypo be given. Mucous secretion is practically absent in children when using Cotton Process or Mallinckrodt ether. Recovery is quickest after Cotton Process ether. Dental cases remain nicely asleep as long as the ether is given but usually awaken within 5 minutes after it is discontinued. It is my opinion that the *analgesia* Cotton obtained is possible only with ether fresh from the laboratory on the morning of operation.

ISABELLA C. HERB, M. D., Chicago, Ill.—It seems to me that the action of Cotton Process ether resembles that of chloroform to a marked degree. I have found that with it the induction period is shorter, that a smaller amount is required for maintenance and that muscular relaxation is more quickly secured than with most other ethers. On the other hand an equally small amount of Cotton Process ether, in my experience, depresses respiration. In other words its action stands midway between the best anesthetic ethers and chloroform. I have not had time to study its postoperative effects other than vomiting which occurred in about the same number of cases as after Squibb's ether, when properly administered. I used the full open drop-method of administration without previous medication. I did not try it as an *analgesic* because nitrous oxid-oxygen is used in our hospital in the class of cases in which analgesia might be employed to advantage.

C. C. McLEAN, M.D., Dayton, O.—I am more than pleased with my results with Cotton Process ether and I am using it exclusively in my private work when ether is the anesthetic of choice. So far I have used it in almost 400 cases and have found that induction is more rapid, that less is required to maintain anesthesia and that recovery is more rapid than with any other ether. I have only used it in the Ben Morgan and Gwathmey Vapor apparatus, so I cannot say what results would be obtained by the open drop-method. From the nature of the new ether I cannot see how the results with the open method can be as good as when the ether is confined and vaporized as needed. I have not yet seen an ideal apparatus for administering Cotton Process ether.

I have used it as an analgesic with success for opening abscesses, extracting teeth, removing superficial growths and in other minor surgical procedures. Due to its analgesic properties a very light anesthesia may be maintained with Cotton Process ether and I find this better for ordinary work.

FURTHER CONSIDERATIONS.

So far, only one manufacturer has placed Cotton Process ether on the market, but if its superior advantages are demonstrated by further and widespread use, I presume that others are likely to make and market it. Contrary to a current impression there is no secrecy about its composition. Cotton announced its composition to the Canadian Medical Association, The Interstate Anesthetists and published it as a simply pure ether containing more ethylene gas than is found in solution in the ordinary anesthetic ethers. It complies with the standards of the U. S. Pharmacopea, which however makes no mention of ethylene as a synergist. From analysis it has been found that standard anesthesia ethers, which give good clinical results contain 1 per cent. of ethylene by volume, while the Cotton Process ether, as made by the present manufacturer, contains 2 per cent. ethylene by volume, ½ volume of carbon dioxid and 1 per cent. by weight of ethyl alcohol.

As much as 5 per cent. ethylene by volume can be introduced into ether by the aid of cold and pressure, but there seems to be no particular advantage in greatly exceeding 2 per cent. by volume because the excess quickly escapes as soon as the container is opened.

Cotton also mentions carbon dioxid as one of the synergistic anesthetic gases, but such a small amount can be held in solution, compared with what is procurable by means of rebreathing that its use in the new ether is of doubtful value in consequence. Of course the idea immediately occurs to one that if ethylene is the potent synergist it is alleged to be why it should not be used for anesthesia and the ether omitted. Unfortunately and peculiarly ethylene alone does not produce anything resembling an ether anesthesia, it simply, from what I can learn, acts as an inert gas like nitrogen, if given alone. It appears to be necessary to superimpose the action of ethylene upon that of ether in order to get analgesia or anesthesia.

During the experimental period, I understand that Cotton and his anesthetist friends of Toronto, following the example set by Simpson, when he was seeking a substitute for ether, tried out the various laboratory results on themselves and each other. One substance rendered the experiments numb to external sensation for a period of thirty-six hours, but its by-effects were so unpleasant as to render it unsuitable for analgesia for surgical purposes.

It is hoped that the experimental work along this line, initiated by Cotton, will be pursued further in the hope that the general practitioner may eventually have at hand an agent for *analgesia* that is extremely safe, effective and very simple of administration. It is also to be hoped that the endorsement accorded Cotton's work by the Canadian Medical Association will be seconded by the endorsement of those expert anesthetists who have found that the new ether does what is claimed for it.

1925 SEVENTH AVENUE.

If you are interested in co-operating with the N. A. R. S. in keeping and tabulating uniform anesthesia records, get in touch with Mr. T. T. Frankenberg, Executive-Secretary, 16 East Broad St., Columbus, Ohio, and secure a supply of charts for your own personal use and for the hospitals with which you are connected. Occasional surveys of the uniform anesthesia records will provide much of interest and instruction and your co-operation will bring its own reward in the lessons learned.

American Journal of Surgery

QUARTERLY SUPPLEMENT *of*
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F. HOEFFER McMECHAN, A.M., M.D., *Editor*
Avon Lake, Ohio, U.S.A.

OCTOBER EDITORIALS 1920

RESULTS OF A SURVEY BY THE NATIONAL ANESTHESIA RESEARCH SOCIETY OF A SELECTED GROUP OF HOSPITALS TO DETERMINE THE STATUS OF ANESTHETIC SERVICE.*

One of the initial efforts of the National Anesthesia Research Society was a survey of a geographically limited group of hospitals selected with a view of determining the general status of anesthetic service. The following results as compiled, tabulated and charted speak for themselves.

GENERAL RESULTS.

Some 500 Questionnaires were sent out and almost 200 were returned.

Total number of questionnaires received	181
Questionnaires filled out and analyzed	147
Returned blank	17
Returned from hospitals using no anesthetics	17
	181

Analysis of questionnaires used:

Number indicating source	143	
Number without source	4	
	147	147
Number of hospitals using no anesthetics		17
Returned from hospitals out of business		3
Returned from hospitals having no records		4
Returned blank		10
Total		181

QUESTION NUMBER ONE.

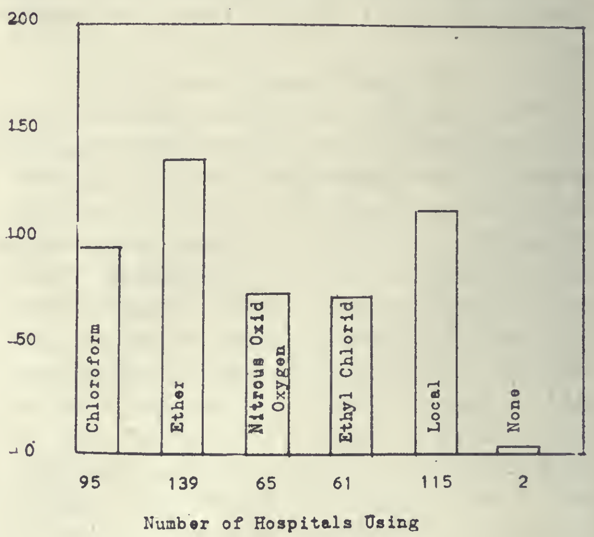
Please Enumerate What Anesthetics Are Employed in Your Hospital?

Analysis of Answers:

Anesthetics.	No. of Hospitals Using.
Chloroform	95
Ether	139
Nitrous oxide-oxygen	65
Ethyl chlorid	61
Local anesthesia	115
None	2
	477

It will be noted that the total number of anesthetics used does not correspond with number of hospitals using, as in almost every case more than one kind of anesthetic is used. This is particularly true in respect to local anesthetics as opposed to general anesthetics, as the uses are still quite different, local anesthetics being more generally used in minor operations.

COMPARISON OF ANESTHETICS EMPLOYED IN VARIOUS HOSPITALS



QUESTION NUMBER TWO.

What is the Actual Number of Anesthetics Given During the Year 1919?

Analysis of Answers: These answers have been divided into groups for the purpose of charting, as the number varies with each individual hospital.

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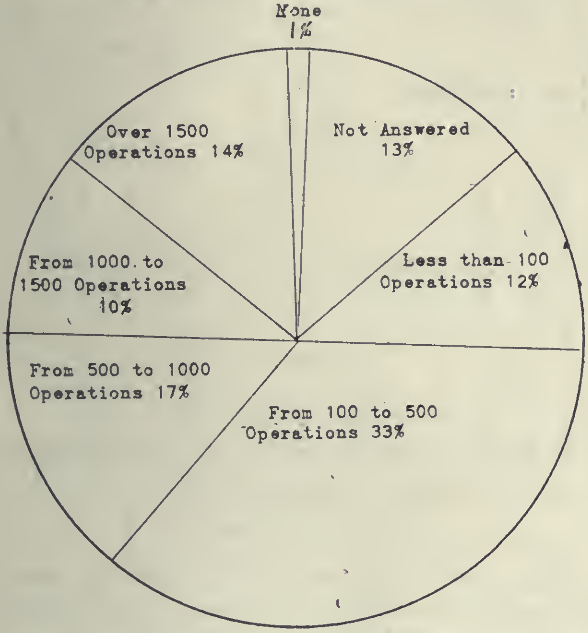
*The tabulation and charting of the Questionnaires of the N. A. R. S., were done by *The Business Bourse*, International Inc., New York City.

Number of Operations and Hospitals.		Total Number of Operations.
None to 100 operations	18	784
100 to 500 operations	48	14,384
500 to 1,000 operations	25	17,861
1,000 to 1,500 operations	15	17,306
1,500 to 2,000 operations	13	22,022
2,000 and over	7	19,070
No operations	2	
Not answering	19	
Total	147	91,427

SHOWING COMPARATIVE GROUPS OF HOSPITALS AS TO NUMBER OF OPERATIONS DONE AND ANESTHETICS ADMINISTERED DURING 1919.



QUESTION NUMBER THREE.

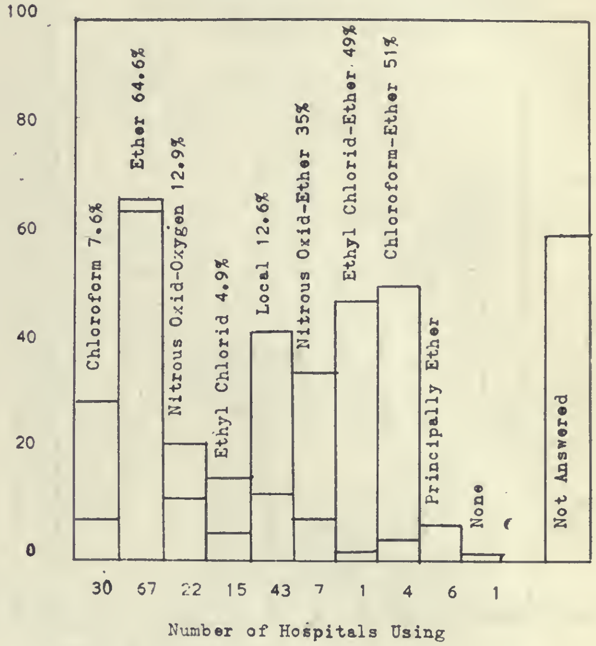
Give Relative Proportion of Use, Stated in Percertages of Number of Cases?

Analysis of Answers:

Anesthetics.	No. Hospitals Using.	Average Percentage of Cases in Which Used
Chloroform	30	7.6%
Ether	67	64.6%
Nitrous oxid-oxygen	22	12.9%
Ethyl chlorid	15	4.9%
Local	43	12.6%
Nitrous oxid-ether	7	35. %
Ethyl chlorid-ether	1	49. %
Chloroform-ether	4	51. %
Principally ether	6	
Not answered	60	
Total	256	

This question appeared to be confusing, as the answers were so worded as to make analysis difficult. In many instances different anesthetics were named, making the total of users higher than the total number of Questionnaires.

RELATIVE USE OF VARIOUS ANESTHETICS AND PERCENTAGES OF CASES



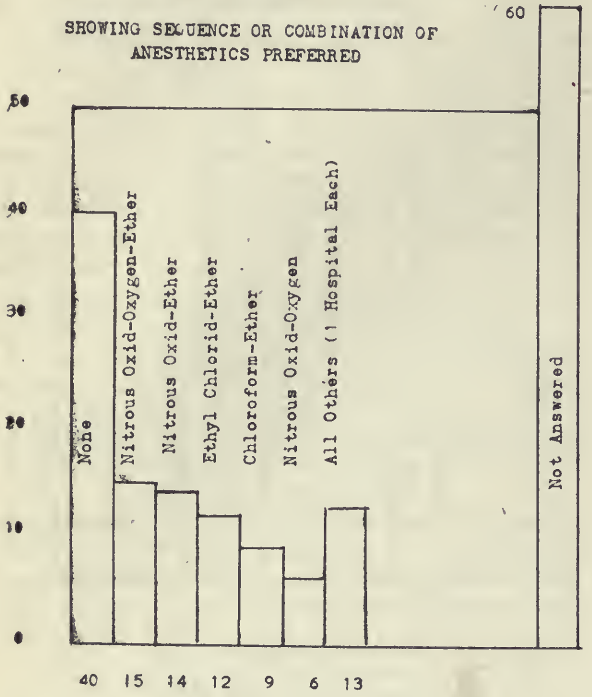
QUESTION NUMBER FOUR.

What Combinations or Sequences of Anesthetics Do You Use?

Analysis of Answers:

Anesthetics.	No. of Hospitals Using.
Not answered	60
None	40
Nitrous oxid-oxygen-ether	15
Nitrous oxid-ether	14
Ethyl-chlorid-ether	12
Chloroform-ether	9
Nitrous oxid-oxygen	6
Ether-oxygen	1
A. C. E. or A. C. E.-ether	1
Ether-oil colonic	1
Ether (open drop)	1
Oil of orange-ethyl chlorid-ether	1
Oil of orange-ethyl chlorid-ether-oxygen	1
Novocaine-adrenalin	1
Cocain-adrenalin	1
Novocain-nitrous oxid	1
Stovain	1
Scopolamin-morphin-ether	1
Cocain-ethyl chlorid-ether	1
	169

In almost every instance in which this question was answered more than one combination or sequence was reported as used, making the total number of hospitals larger than the number of Questionnaires considered.



SHOWING SEQUENCE OR COMBINATION OF ANESTHETICS PREFERRED

QUESTION NUMBER FIVE.

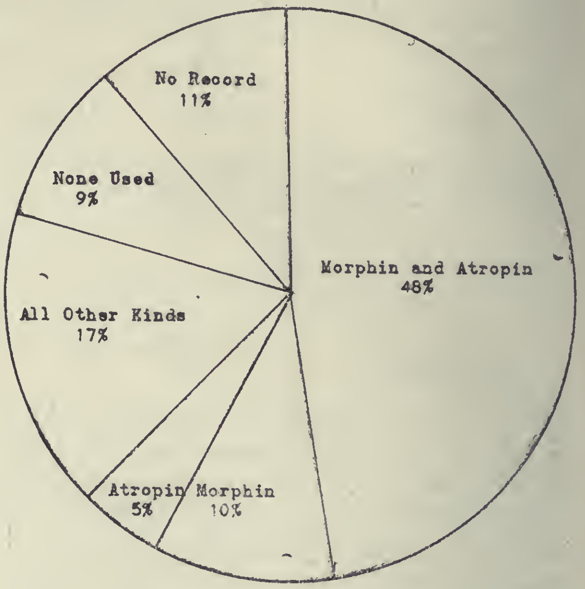
Do You Use Premedication? If So, What?

Analysis of Answer:

Premedication.	No. of Hospitals Using.
No	15
Not answered	19
Morphin-Atropin	80
Morphin	17
Atropin	9
Scopolamin	5
Morphin-Scopolamin	4
H. M. C.	3
H. M. C.-Morphin-Atropin	2
H. M. C.-Morphin	2
H. M. C.-Morphin-Scopolamin	1
Morphin-Hyoscin	1
Chlorotone	1
Ether	1
Codein	1
Scopolamin-Pantopon	1
Hyoscine-Codein	1
Hypo as prescribed	3
Total	166

Many hospitals use more than one kind of premedication, depending on the type of operation and the condition of the patient.

COMPARATIVE KINDS OF PREMEDICATION USED IN VARIOUS HOSPITALS



QUESTION NUMBER SIX.

How Many of Your Physicians Prefer Chloroform, Ether, Nitrous Oxid-Oxygen, Ethyl Chlorid or Local Anesthesia?

This question was answered in different ways, and necessitates different divisions in the conclusions drawn. Also there is a duplication of preference due to the different uses of the anesthetics named, many preferring to use general anesthesia for major operations, while using local anesthesia for minor operations or for nose and throat work.

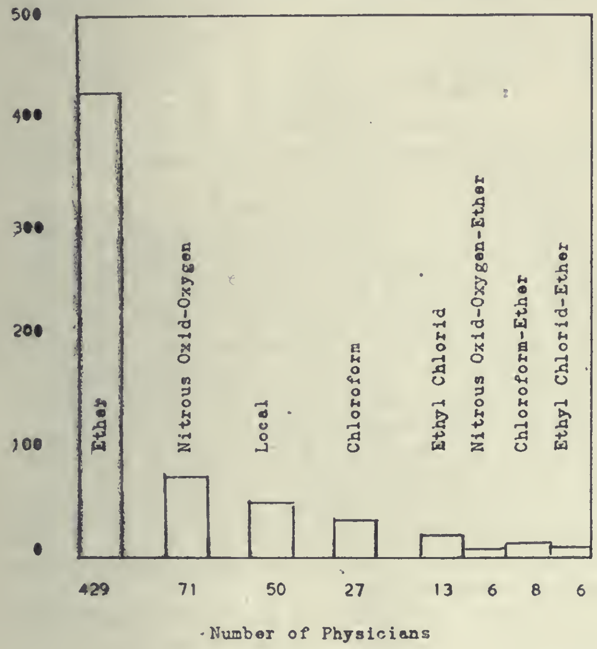
Analysis of Answer:

Anesthetics.	No. of Physicians Preferring.
Chloroform	27
Ether	429
Nitrous Oxid-Oxygen	71
Ethyl Chlorid	13
Local	50
Nitrous Oxid-Ether	6
Ethyl Chlorid-Ether	6
Chloroform-Ether	8
Not answered	23
Total	633

Number of hospitals in which the number of physicians is not specified.

Anesthetics.	All Use.	Few Use.	Majority Use.
Chloroform	6	1	3
Ether	40	—	20
Nitrous Oxid-Oxygen	6	6	—
Ethyl Chlorid	2	8	—
Local	13	7	—
Chloroform-Ether	1	—	1
Total	68	22	24

COMPARISON OF ANESTHETICS ACCORDING TO NUMBER OF PHYSICIANS PREFERRING SAME



QUESTION NUMBER SEVEN.

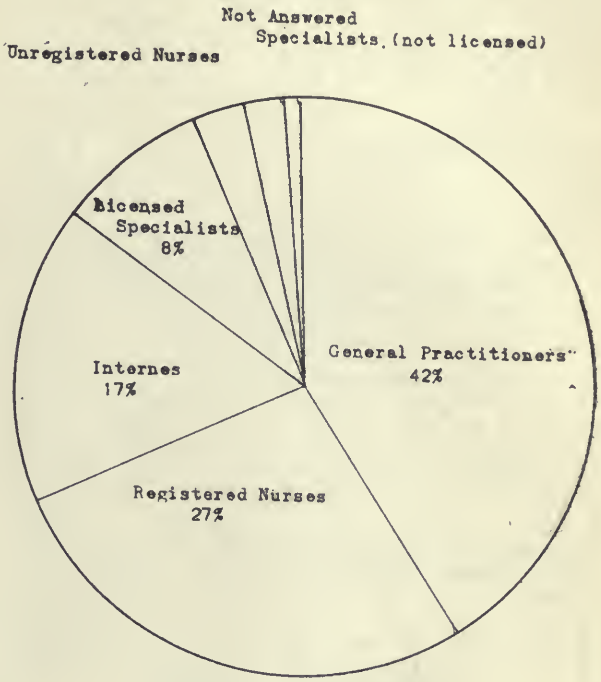
By Whom Are Your Anesthetics Regularly Administered?

Analysis of Answer:

By Whom.	No. of Hospitals.
General practitioners	89
Internes	30
Registered nurses	59
Unregistered nurses	7
Licensed specialists	18
Specialists	3
Not answered	6
Total	212

In many instances the hospitals reporting use two or more persons of the varying types specified. For instance internes, nurses and practitioners may administer anesthetics in the same hospital.

SHOWING BY WHOM ANESTHETICS ARE ADMINISTERED IN PERCENTAGES



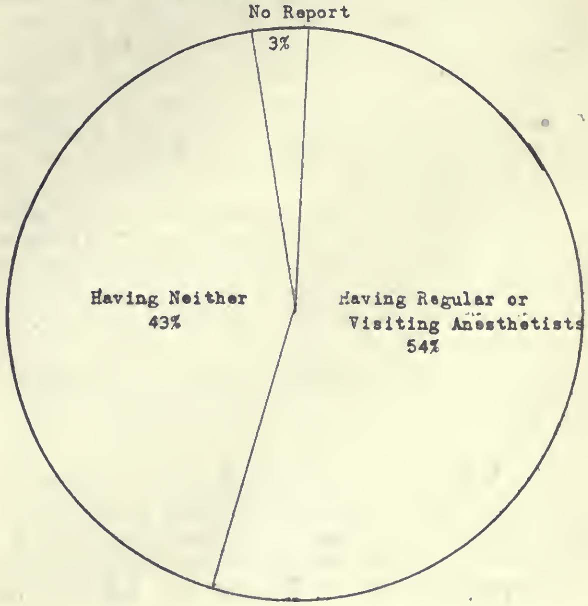
QUESTION NUMBER EIGHT.

Have You a Regular Staff or Visiting Anesthetist?

Analysis of Answer:

Yes	79
No	63
Not answered	5
Total	147

SHOWING COMPARATIVE NUMBER OF HOSPITALS HAVING A REGULAR STAFF OR VISITING ANESTHETIST OR NOT ANSWERING



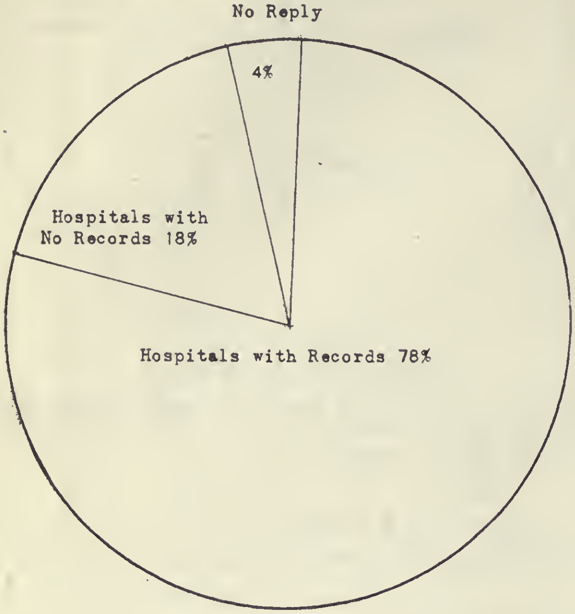
QUESTION NUMBER NINE.

Are Your Answers to This Questionnaire from Records on File in Your Hospital?

Analysis of Answer:

Yes	115
No	27
Not answered	5
Total	147

SHOWING NUMBER OF HOSPITALS HAVING RECORDS ON FILE TO COVER QUESTIONS INCLUDED IN THESE QUESTIONNAIRES COMPARED TO THOSE HAVING NONE OR FAILING TO MAKE ANY REPLY



CANADIAN SOCIETY OF ANESTHETISTS.

The Canadian Society of Anesthetists has been recently organized and the following have been elected to manage its affairs: Samuel Johnston, Toronto, President; William Webster, Winnipeg, Vice-President; Wesley Bourne, Montreal, Secretary-Treasurer; and Charles H. Bastin, Vancouver; G. M. Geldert, Ottawa; W. B. Howell, Montreal, and Charles LaRoque, Montreal, Members of the Executive Committee.

The Society has applied for and has been granted a charter by the Canadian Government. The purposes for which the Society has been organized and chartered are:

1. To promote the science, practice and teaching of anesthesia.
2. To establish friendly relations between its members.
3. To promote the interest of anesthetists as specialists.
4. To facilitate for its members the means of acquiring fuller knowledge of their profession in such manner as experience might show to be desirable and in particular by lectures, professional meetings and by the publication of articles and papers relating to the science, practice and teaching of anesthesia.

Membership in the Society is divided into four classes, fellows, ordinary, associate and honorary members.

The Society will hold its first scientific meeting in 1921.

The officers of the new Society are all well known to the anesthetists on this side of the border and some of them have been accorded the highest distinctions within the gift of the anesthetic associations of the United States. There is no doubt that under their guidance and fostering care that not only the Society but the specialty of anesthesia will come into its own in Canada.

All those who are interested in becoming members are requested and urged to get in touch with Wesley Bourne, M.D., 34 St. Marks St., Montreal.

ACTIVITIES OF THE NATIONAL ANESTHESIA RESEARCH SOCIETY.

The Board of Governors of the National Anesthesia Research Society met in Minneapolis, Minn., September 5-6.

One of the outstanding features of the meeting was the adoption of the uniform Anesthesia Record as drawn up and submitted by the advisory committee composed of Drs. A. H. Miller, Providence, R. I.; E. I. McKesson, Toledo, O., and A. F. Erdman, Brooklyn, N. Y. This Record is based on the standards set by Dr. W. W. Keen of Philadelphia and its routine and extended use is calculated to become a tremendous safety-first movement to protect the lives and assure the recovery of all patients coming to operation under anesthesia. It is particularly adapted to obviating preventable anesthetic accidents and deaths by compelling proper classification of surgical risks and the use of blood pressure guides during operation.

It is to be hoped that all specialists in anesthesia will begin the use of this Record and see to its introduction into the hospitals they serve.

Page proofs of a Monograph on "Nitrous Oxid-Oxygen Analgesia and Anesthesia in Normal Labor and Operative Obstetrics," just off the press, were shown and it was announced that it would be completed and available in a few weeks. This Monograph represents the first of a series to be devoted to certain phases of anesthesia and analgesia as they apply to the several specialties in medicine and dentistry.

Drs. Isabella Herb, A. H. Miller and the Editor of the SUPPLEMENT were selected as judges to award the prizes for the best research papers in anesthesia to be presented at the Pittsburgh meeting.

The N. A. R. S. has decided to investigate all reported accidents and deaths under anesthesia with a view to determining their causes and if possible providing the information that will prevent their recurrence. Anesthetists, surgeons, specialists and dentists are urged to report their cases to the N. A. R. S. with every assurance that their source of origin, if desired, will be kept strictly confidential.

THE AMERICAN YEAR-BOOK OF ANESTHESIA AND ANALGESIA.

As this issue of the Supplement goes to press page proofs of the new Year-Book, covering the advances in anesthesia and analgesia for 1917-18, are in the hands of the Editor. Copies of the Year-Book will shortly be available and judging by the scope of the subjects covered and the authority of the contributors and the wealth of illustrations it should surpass the expectation of those who found the first edition of the Year-Book so serviceable.

Owing to the extremely high cost of publication and the rapid rise of prices no price has as yet been made for the new Year-Book but every effort will be made to make the price as reasonable as is consistent with the cost of production.

Send in your advance order now as the edition will be limited and there is every prospect that it will be sold out in a short time.

Medico-Legal Aspects of Anesthesia

USING UNFIT ETHER—RULES OF LIABILITY AND EVIDENCE.

The Supreme Court of Minnesota, in an action brought against the manufacturer of a certain ether and two surgeons, who used it, (in 176 N. W. R. 16) affirms an order denying the surgeons a new trial after a verdict was rendered against all of the defendants, in which a young man in good general health submitted to an operation by the surgeons, for the removal of his tonsils, and he never recovered from the administration of the ether, but died as a result in a few hours. That there was fault somewhere, the court says, was clear. On a former appeal taken by the manufacturer, this court held (141 Minn. 154; 169 N. W. 541) that there was evidence to sustain a finding that the ether was unfit for use, that its use was dangerous to life, that the manufacturer was negligent in putting it on sale, and that its use was a proximate cause of the patient's death. One of the defendant surgeons testified that during the operation the patient came out rather quickly from the ether, so he administered a little bit more, but noticed that it was hard fully to relax the patient, who seemed to resist every time an attempt was made to remove the tonsils, and the witness did not like to push the anesthetic because when he did push it a little the patient became cyanotic. The other surgeon said the trouble was of such a nature that if the operation had not been partly completed and it had been a long operation he would not have finished it; would not, if it would have taken half or three quarters of an hour. But there was evidence that the administration of ether extended over three-quarters of an hour. Moreover, it was alleged that there was want of proper care after the operation in that, very soon after it, cyanosis appeared and the patient was in a very critical condition until about noon, when he died, and that the defendant surgeons neglected to give him the constant care which the critical nature of his case required. The court holds that the evidence in the case was sufficient to sustain a finding that the surgeons were negligent in administering to a patient ether that was unfit for use, and in their care after the ether was administered.

The skill and diligence which the law requires of a physician or surgeon is such as is usually exercised by others of the same school. He is not necessarily liable for malpractice because of a bad result. He must often act promptly, on his best judgment, and he is not liable for injuries arising, without negligence from honest errors of judgment. But this is an exception to general rules of negligence and the exception is not absolute. Every act of his is in a sense an exercise of judgment and usually of honest judgment. Yet it may be negligent. He might be honest in his judgment that he could leave certain details to an assistant and yet be liable for negligence in doing so. He is liable if his mistake of judgment is so gross as to constitute negligence. He is bound to observe plain physical laws; or he may be liable when his wrong concerns physical facts and is governed by ordinary principles of intelligence. If a surgeon persists in the use of an anesthetic after warning which would impel one of reasonable prudence to desist, he should be held to answer for the consequences.

The defendant surgeons insisted that since no expert witness testified that they did or omitted to do anything contrary to good surgery and practice, it was the duty of the court to direct a verdict in their favor. But the supreme court does not concur in this contention. From the testimony of the defendant surgeons, and from common knowledge of physical facts and laws, the jury might infer that if they had desisted from the use of the ether at the first sign of danger, the patient's life might have been spared, and that reasonable prudence required them to do so. It is only in cases wherein the evidence and the facts to be deduced therefrom are undisputed, and the case concerns a matter of science or specialized art, or other matters of which a layman can have no knowledge, that the opinion of experts is conclusive. This was not such a case. For similar reasons the testimony of a physician exonerating the defendant surgeons was not conclusive.

Nor was it error to receive the testimony of a physician as to the effect of the use of ether from the same container on the following day. That testimony tended to show the character of the ether.—(*Jour. A. M. A.*, September 11, 1920).

Book Review

Oral Anesthesia: Local Anesthesia in the Oral Cavity: Technic and Practical Application in the Different Branches of Dentistry. By Kurt H. Thoma, D.M.D., Assistant Professor of Oral Pathology and Member of the Research Department, Harvard University Dental School, etc. *Second Edition,* Revised with 79 illustrations. M. C. Cherry, Publisher, 22 Seymour St., Boston, 1920.

The continuous demand for Thoma's Oral Anesthesia has made it necessary for the publishers to issue a new edition and the author has used this opportunity to entirely rewrite his work. The volume is now opened with a description of the nature of pain and fear, the two emotions which are so closely related and which have such a profound effect upon the patient. It is no longer sufficient to control pain alone and the successful anesthetist and operator must be able to secure a helpful and co-operative attitude on the part of those coming to operation.

Thoma has always differed somewhat from other authorities on the dosage of procain and suprarenin and in his present edition he emphasizes the value and safety of the T. and H. tablets especially prepared to meet his requirements.

The technics of the injections described in the first volume have stood the test of time, but newer methods have since been developed and have been incorporated in this second edition. The extraoral methods, which are of great value in war surgery and extensive oral operations in general, are described in careful detail and many new illustrations have been added to make the text more comprehensive or to replace obsolete ones. The chapter on Ill Effects, Failures and Accidents, and Postoperative Sequelæ has been entirely changed, more careful considerations, experience, and research work having done a great deal toward a better understanding of these conditions.

Thoma's book is of equal value to the operator, teacher and student. It is invaluable to those who wish to perfect themselves in oral anesthesia and Thoma advocates nothing short of the perfection he, himself, has striven for and attained.

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GASTRIC RESECTION AS THE METHOD OF CHOICE IN THE SURGICAL TREATMENT OF ULCERS OF THE STOMACH.*

Dr. J. Abadie,
Oran.
Chief Surgeon to the Hospital; Corresponding Member, Société de Chirurgie de Paris.

This article is based on a series of thirty cases of gastric resection for ulcer of the stomach. Cases of gastroenterostomy and resection of the ulcer are excluded.**

These cases include: 17 primary pylorectomies, more or less extensive, excising from six to ten or twelve centimeters; one two-stage pylorectomy (in which the resection was performed two months after the preliminary gastro-enterostomy, because of the extreme inaniton of the patient); two pylorectomies performed one and six years after gastroenterostomies that had failed to effect complete cures; ten extensive gastrectomies, resecting at least to the angle of the lesser curvature, six of which were performed with side-to-side anastomoses and four with end-to-side anastomoses. None of these patients were submitted to a general anesthesia.

These thirty resections, which varied from limited pylorectomies to extensive gastric resections, including more than three-quarters of the stomach showed a mortality of two, with twenty-eight cures. These two deaths were due in one case to secondary hemorrhage from an adherent pancreas, in the other to leakage from the duodenal stump, with peritonitis, on the seventh day.

The failures may be properly considered due to faulty technique, and they are probably avoidable and will occur with decreasing frequency in the hands of the same operator as the number of his cases increase. (This statement is not absolutely true, however, as the second death occurred in one of the author's last cases, in which recovery seemed fairly certain).

In this short communication, I am compelled to dismiss the subject of technique in order to emphasize the essential factors of pathology and diagnosis, and to outline accurately the operative indications.

Lesions. The diagrams in this article show the lesions and emphasize the necessity of the resections which were performed. There were eight ulcers of the lesser curvature, extensive and deep enough in most cases to prevent removal of the base of the ulcer. which was formed not by eroded stomach wall, but by extensively adherent neighboring organs (figs. 1 to 4); one ulcer of the anterior wall, superficial, in a female; one double ulcer of the antrum; one mid-gastric and pyloric stenosis caused by cicatrization of old ulcers (fig. 5); one simple hypertrophy of the pylorus without visible signs of ulcer or cicatrix; eighteen ulcers of the pyloric region divided as follows: one saddle ulcer of the pylorus, four prepyloric, ten situated just on the duodenal side of the pylorus, one of these double, and three more almost completely cicatrized (figs. 6, 7, 8).

The important points are the following: the frequency of ulcers of the lesser curvature, and their progressive gravity without tendency toward cicatrization (except in one case of mid-gastric stenosis);* the marked predominance of the duodenal situation in ulcers of the pylorus (13 as against 4), and slight tendency toward cicatrization particularly in the duodenum; the fairly frequent multiplicity of ulcers (three cases).

Etiology. Only two cases occurred in women. The cases in men were often soldiers returning from long captivity in Germany.

Diagnosis. The examination of the gastric contents after Ewald test meal was made in all cases, as well as the Meunier** test. The results were in accord in nearly all cases (hyperacidity from 1.25 to 3.50, rupture of the ether pearl in 15 minutes to one hour and a half). We test only for total acidity, free acidity, lactic and butyric acid, We do not lay much stress on fractional tests.

The Meunier test is extremely simple. It is therefore advisable to make as many examinations as possible with the same catgut, preferably coarse.

One source of error should be pointed out. In cases where there is a large stomach with permanent stasis, a hypoacidity may be found, or occasionally an achlorhydria, with Meunier test positive only after four or five hours. The reason for this lies in the accumulation of the products of digestion and gastric secretions whose chemistry is modified by secondary fermentation, and whose presence retards the glandular activity. It is therefore preferable in cases where the stasis is recognized to perform a lavage of the stomach the day before the tests.

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*Manuscript received in French.

**Communication to l'Académié de Médecine, Paris, Nov. 25, 1919.

*I have twice verified neoplastic transformation in ulcers of the lesser curvature, by histological examination. These two cases of ulcero-cancers cases, both cured surgically, do not enter into these statistics.

**I shall not here discuss the examination for blood in stomach contents or feces, the cytology of the wash-fluid from the stomach, the examination of the blood itself, nor the determination of diacetic acid in the urine.

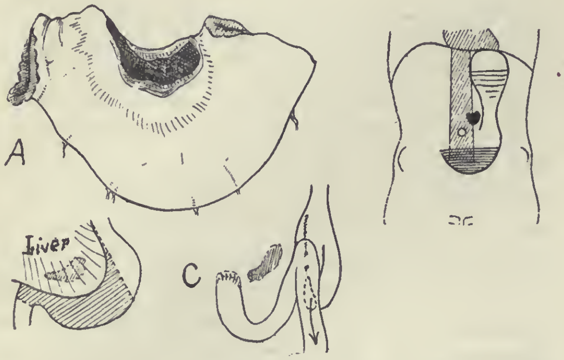

Fig. 1—Radioscopy: Shadow of diverticulum; no peristalsis; practically complete stasis, even after 24 hours. Extensive ulcer of the lesser curvature, adherent to the liver; (A) very extensive gastrectomy, leaving the base of the ulcer in place; (B) end-to-side anastomosis; (C) cure.

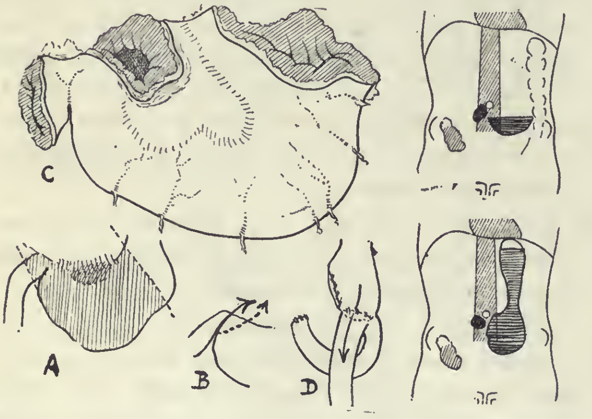

Fig. 2—Radioscopy before and after ingestion. Extensive ulcer of the lesser curvature, adherent to the liver, with stenosis due to cicatrical retraction; (B) gastrectomy; (A) including more than two-thirds of the stomach; (C) leaving the base of the ulcer in situ; end-to-side anastomosis; (D) cure.

Radioscopic examinationns are performed as a routine, according to the technique ,of Enriquez occasionally supplemented by successive examinations. Amongst the x-ray findings there were: 14 cases of stasis after fasting; 6 cases in which the "Niche" of Haudek was found and in each of which at operation an ulcer was found in the corresponding location on the lesser curvature; but the niche was found in only six out of eight cases, which, however, is a good proportion. The niche was never demonstrated in any case of prepyloric ulcer. Only once did a clean cut and constant roentgenoscopic defect coincide with a duodenal ulcer. In one case the x-ray showed an hour-glass deformity, which was not permanent but of long duration. The diagnosis of ulcer of the lesser curvature was made, probably in evolution. The diagnosis of ulcer was correct, but the situation was wrong. The apparent constriction showed at a location above the middle of the stomach, and the ulcer was located on the lesser curvature 6 cm. from the pylorus. It is therefore possible for an ulcer to cause a persistent spasm or constriction above its location

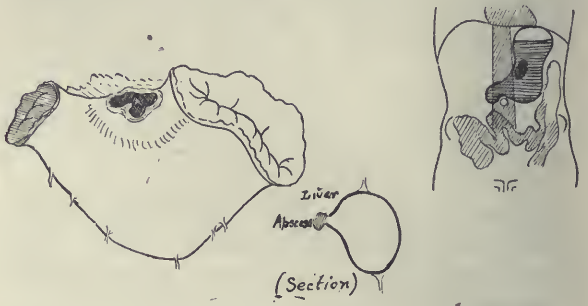

Fig. 3—Radioscopy: No stasis; shadow taking the shape of a long diverticulum, the picture taken laterally. Ulcer of the lesser curvature adherent to the liver, with the formation of a small abscess. Extensive gastrectomy leaving the base of the ulcer in place; posterior trans-mesocolic side-to-side anastomosis; cure.

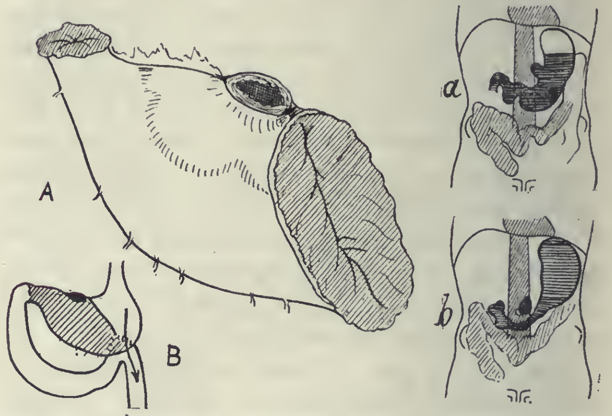

Fig. 4—(a) Radioscopy, standing; (b) Radioscopy, lying. Ulcer of the lesser curvature, adherent at its base. Large gastrectomy, (A) end-to-side anatsomosis; (B) cure.

It should not be necessary to emphasize the utility and importance of radioscopy in gastric diagnosis. It should be performed under varying conditions. In France we are usually content with examinations in the standing or lying positions; but this is insufficient. We should be able to follow on the screen the changes which occur in the transition from the upright to the prone position. It is regrettable that in France there are no tables made with variable inclinations. Such models are plentiful in America and in England, and it would not require any extraordinary ingenuity to make such tables, simply and inexpensively.

It would be a distinct advantage if the radioscopy could be performed by the surgeon himself, or at least in his presence and with his active collaboration. It would thus be possible for a single observer, the surgeon, to have the composite picture of the clinical examination, the laboratory results, the *x*-ray findings, and finally the control of the operation, showing the value of the various findings in reference to diagnosis, and explaining thus the errors made. The practical and scientific value of such a procedure is evident.

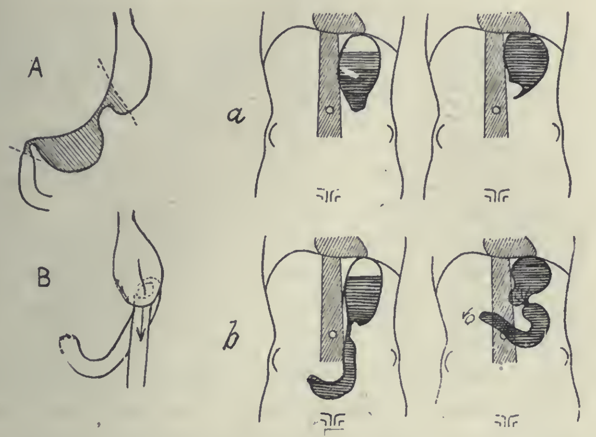

Fig. 5—(a) Radioscopy during a quiescent period. Standing and lying. (b) Radioscopy during a quiescent period. Double stenosis, mid-gastric and duodenal. Resection of the two stenoses and the intervening pocket; (A) posterior side-to-side anastomosis; (B) cure.

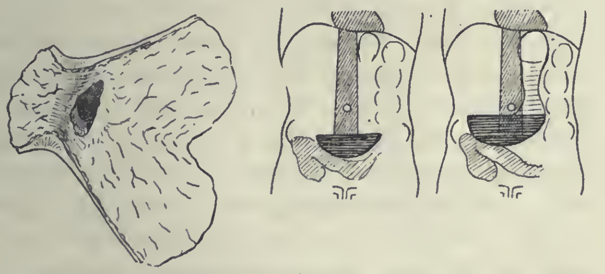

Fig. 6—Radioscopy: Before ingestion, marked stasis; after ingestion, stomach dilated, hypotonic, orthosthenic without visible evacuations. Prepyloric ulcer with stenosis. Extensive pylorectomy, posterior side-to-side gastro-enterostomy, cure. The specimen is shown by its mucous surface after having been cut along the line of the greater curvature.

Operative Indications. The patient, aged about forty, has had several gastric attacks of increasing severity, separated by remissions of apparent well-being that are becoming increasingly shorter and less frequent. Medical treatment, well conducted, has proved of no avail. These facts alone constitute an operative indication. One need not delay for signs of hemorrhage or stasis.

Radioscopy is undertaken to confirm the judgment; occasionally it resolves all doubt by positive demonstration; sometimes it helps in localizing the ulcer, and in determining the relation of the neighboring organs, which facts have a bearing on the operative procedure. But *x*-ray findings should never be allowed to rule against an operation that is indicated clinically.

Examination of the gastric secretions is of minor importance when making a decision whether to operate or not. Its great value lies in the early diagnosis and before instituting medical treatment.

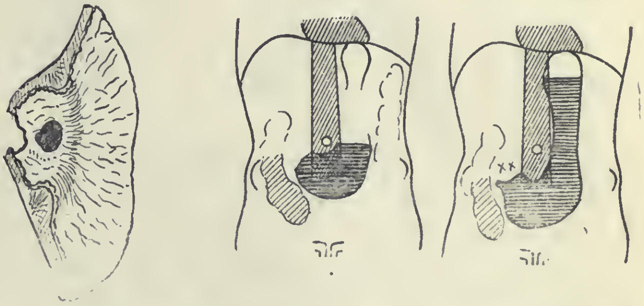

Fig. 7—Radioscopy before and after ingestion: Marked stasis; dilated stomach; pyloric contractions few and ineffectual. Duodenal ulcer, close to the pylorus, with stenosis. Pylorectomy, posterior side-to-side gastro-enterostomy, cure.

Therefore, when the lesion to be treated is an ulcer* it is, above all, the clinical history that makes the surgical indication.

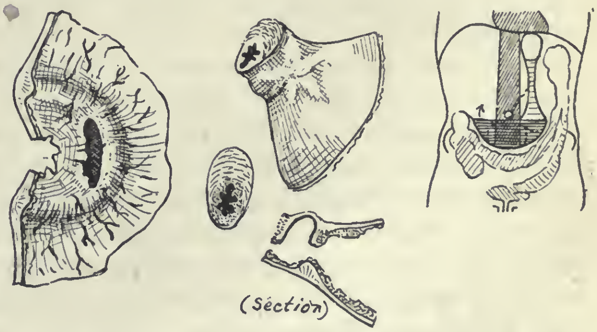

Fig. 8—Radioscopy: Hypotonic stomach; alternating periods of quiescence, and of contractions, vigorous but ineffectual. Ulcer of the duodenal side of the pylorus, with stenosis due to cicatricial fibrosis, thickening the superior wall, thus narrowing the lumen. Pylorectomy, posterior side-to-side gastro-enterostomy, cure. The section is made in the direction of the greater curvature.

Why gastrectomy and not merely gastro-enterostomy? Granted that gastro-enterostomy cures a certain number of cases; nevertheless there always is a considerable number of failures—incomplete cures, recurrences, cancerous degeneration, etc. On the contrary, gastrectomy usually results in complete and lasting cures. There is only one argument in favor of gastro-enterostomy, and that is its lesser gravity.

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*I say ulcer because the ulcerated stomach cries out its warnings before it is too seriously involved; it cries out because its physiology is disturbed before its anatomy, its chemistry before its dynamics. It is very different when the disease is a cancer; here the lesion, at first circumscribed and painless, affects the glandular chemistry or the dynamics of the organ, only as it progresses in depth or in extent; when the stomach then cries out surgical effort is too often in vain. One is therefore quite right to say "it is sufficient to suspect the possibility of cancer to justify operation." It is the semi-surprises, scarcely foreseen, the chance cancer find on exploratory laparatomy, that provide successful removals.

It is just on this point, however, that our opinion should be revised.

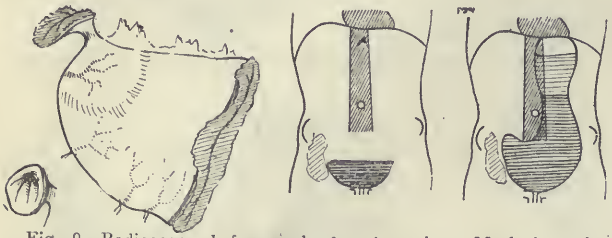

Fig. 9—Radioscopy before and after ingestion: Marked stasis; large, atonic, asthenic stomach. Pyloric stenosis. Marked constriction due to cicatrix of duodenal ulcer. Pylorectomy, posterior gastro-enterostomy, cure.

The matter of technique assumes in this respect a most important relation. Perfection of technique not only diminishes operative risks but improves the already high percentage of good results as evidenced notably by the statistics of Mayo, Temoin, Pauchet, etc. And for each surgeon, the operative indications are extended as his own technique improves. Thus the number of exploratory operations will increase, doubtful cases may be cleared up after the abdomen is opened, and technic therefore assumes a diagnostic as well as therapeutic importance.

I shall treat the subject of technic in another paper, showing the different methods employed.

Finally, it might be added that there is no branch of surgery more important from the social standpoint than that of the ulcerous lesions of the stomach. It is often possible to transform a chronic invalid, who has been suffering and incapacitated for years, into a vigorous, productive, individual in the short space of three weeks.

Abdominal Pain and Vomiting.

Where pain is preceded by vomiting, other things being equal, a diagnosis of appendicitis need not be considered. We may then in the adult think of gall-bladder inflammation. The forerunners of gall-stone disease are indigestion, slight discomfort after eating, not actual pain, but simply discomfort in some instances, shifting to the right costal margin or to the back, belching gas, nausea and often vomiting. The symptoms of an acute attack are sudden pain, preceded or followed by nausea, vomiting, the latter when severe causing marked prostration, and generally some enlargement in the gall-bladder region.—John B. Deaver in the *N. Y. Medical Journal.*

CHILL AS A DIRECT CAUSE OF POST-OPERATIVE BRONCHIAL IRRITATION.

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London.
Anesthetist and Lecturer on Anesthetics, King's College Hospital, London; Late Lieut.-Colonel, Royal Army Medical Corps; etc., etc.

In the August, 1920, issue of the Journal, Dr. McCormick of Akron, O., enters a protest against the misleading use of the term "ether pneumonia" which is still in vogue with certain writers. With this protest I cordially agree. I am inclined, however, to go further than he does in the matter, and to say that defective ventilation plays a very much more important part in the production of these troubles than mere *chilling.* I do not doubt that *chilling,* by depressing the vitality of the individual, renders him liable to all kinds of bacterial infection, but this only means that exposure to prolonged cold, or alternations of temperature is one of the many predisposing causes of infection, and I even doubt whether it is really a very important one. If this were otherwise, I fail to understand how anyone ever escapes a prolonged and violent attack with the onset of the cold weather, especially those who live in the over-heated rooms of big cities, or are subjective to operative and other depressing influences.

As a contribution to the solution of this problem I should like to put on record some observations which I made during the period, August, 1915, to March, 1919. During that time I was employed in visiting the principal war hospitals in the United Kingdom and the Sick Base that had been established at Malta, with a view to superintending and reporting upon the administration of anesthetics. At a very moderate computation I must have paid at least a thousand visits to about 200 different hospitals, so that many opportunities were afforded me for studying the subject.

In the hospitals of the United Kingdom complaints as to the occurrence of postoperative bronchial and pulmonary troubles were frequent, and in accordance with traditional teaching were set down off-hand to the anesthetic, especially when ether had been used. At first the peculiar incidence of these troubles rather puzzled me, for whilst the complaints from certain hospitals might be very emphatic, it sometimes happened that these troubles chiefly occurred in the practice of certain surgeons, and quite frequently the staffs of other hospitals in the immediate neighborhood could not be induced to admit that they were ever troubled in this manner.

I. It soon became evident that the complaints might fairly well be anticipated from two distinct types of hospitals, viz:

1. Old Military Hospitals and converted old Workhouses and Workhouse Infirmaries.

2. Military Hospitals of the latest type attached to the large Training Camps and Centers.

In respect of the older establishments a feasible explanation was, that from prolonged use they had become thoroughly saturated with infective germs, which only required a suitable nidus for their development.

II. At both the old and the new hospitals complaints with regard to bronchial troubles were not uncommonly associated with records of malaise and "operation headache" among the nursing and theatre staffs. In fact, in some cases these latter complaints were more apparent and more insisted upon than the bronchial troubles of the patients.

III. At nearly all the hospitals considerable attention had been very properly paid to questions of warming, and the provision of adequate sterilizing arrangements. To secure the latter, and indirectly to assist in the warming, open gas rings and burners were freely employed. As an anesthetist, I naturally objected to these burners being situated within range of the operating table, and took every opportunity of demonstrating the danger of the arrangement, not only as regards the possibility of igniting the ether, but also because of the decomposition of the chloroform vapor when brought into contact with a naked flame. For various reasons I was unable to secure the abolition of these rings entirely, but in many instances it was possible to place them under special hoods or ventilating shafts, and in some cases to install special ventilating extraction fans in the immediate vicinity of the burners. Although these corrections were of a somewhat makeshift character it was pleasing to find that in very many instances "operation headache" nearly or entirely disappeared, and the incidence of postoperative bronchial troubles if not entirely abolished was at any rate generally reduced by 50 to 75 per cent.

My greatest difficulty was with regard to the new hospitals alluded to above, for in the planning of these it had apparently been considered that sufficient and adequate ventilation could be obtained if it were suggested that, between consecutive operations, all the doors and windows should be opened, and a thorough "blow-through" obtained. In practice of course this was impracticable, and I never saw any attempt made to adopt it. Moreover, the sterilizing rooms, with its battery of gas stoves was in direct and free communication with the operating area, so that, especially in certain winds, the theatre was flooded with gas fumes, which were too thick for any makeshift arrangement of hoods or fans to cope with.

IV. In some cases, my suggested alterations did not effect any improvement. This no doubt was largely owing to their not being sufficiently drastic, and as this want of improvement was quite frequently the case when the complaints referred more particularly to the work of individual surgeons, I am not without a suspicion that an element of simple sepsis had to be considered. I recall in particular one hospital in which I was taken to see some half a dozen patients who had been operated upon a few days before my arrival, and all of whom had developed well-marked symptoms of what the surgeon called "ether pneumonia." But as all the cases were running high temperatures, and the pulmonary symptoms had not appeared until two or three days after the operation, and from their general appearance also, I had but little doubt in my own mind that these patients were really suffering from a general septic infection.

V. But the most striking evidence in support of the importance of good ventilation is that it was particularly noticeable that in hospitals conducted upon the "open-air" principle, and in the numerous hospitals in Malta, where the climate rendered the very freest natural ventilation imperative, postoperative bronchitis was almost unknown. It is true, of course, that operations were not performed in the open air, but the principles upon which these hospitals were conducted led to the greatest attention being paid to the ventilation in all departments, and in England at any rate, the patients were even more exposed to *chills* than in other hospitals.

VI. I do not think that there is any doubt that the diminution in the amount of mucous secretion which follows the preliminary use of alkaloids has been of great service in diminishing the frequency of bronchial troubles after operations. Another point to be noted is that during prevailing epidemics of influenza many more cases of post-operative bronchitis, etc., arise.

I am incited to these remarks because it is obvious that the bogey of "ether pneumonia" is dying a very hard death, and I am afraid that in its place a more dangerous fetish of *chilling* is being set up—more dangerous because its worship so often entails stuffiness and bad ventilation, the correction of which are in my opinion, of far greater importance.

16 Nottingham Place.

THYROIDECTOMY—A BRIEF REVIEW OF 137 CASES.

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Cincinnati, Ohio.

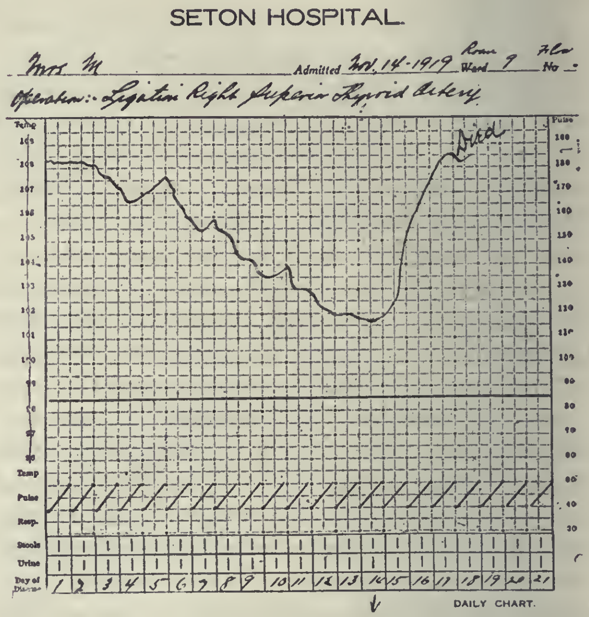
In October, 1919, I published in the American Journal of Surgery a résumé of fifty-five cases of thyroid enlargement, fifty of which were operated upon under local anesthesia with but one death. Of these, thirty-five were cases of well marked exophthalmic goiter. From July 1, 1919, to July 1, 1920, I have added to this list eighty-two cases of thyroid enlargement, with no deaths, making a group of one-hundred and thirty (130) operated cases with but one death, or a mortality in all cases of less than one per cent. Of the last eighty cases, forty-five were distinctly of the systemic or exophthalmic type, while thirteen were toxic as regards metabolic determination, but were without distinct systemic symptoms. The remaining twenty-two were simple or diffuse parenchymatous hypertrophies, or hypertrophies of the adenomatous, colloid or fibrous type.

Of the first series of fifty-five cases, five were refused operation because of their advancement; of the second series of eighty-two cases only two were refused operation because of their advancement. One of these receiving hot water injections but left our care before we could determine any results; and the other died after remaining in the hospital only one week. In these two series arterial ligation was not resorted to in any case. This greater risk in the second series being entirely due to our greater confidence in the use of local anesthesia in these cases. A few inhalations of ether were resorted to in only one case during the enucleation of the lobes because of the panicky state of the patient. In the remaining one hundred and twenty-nine (129) cases all were performed entirely under local infiltration.

In sixty-eight cases of the second series, both lobes and isthmus were removed, leaving only a small portion of glandular tissue at each pole. In the remaining twelve cases the hypertropheid portion alone was removed.

In the first series of thirty exophthalmic cases operated upon, in twenty I removed only one lobe. Five of these cases returned for the subsequent removal of the other lobe. I have recently examined the fifteen cases in which only one lobe was removed and although they show marked improvement in systemic symptoms, yet they could not be considered cured. In seven cases the remaining lobe has undergone compensatory hypertrophy and the disfigurement of the neck therefore still remains. They have been benefited, however, to such an extent that they refuse further operation.

Of the eighty-three cases in which both lobes and isthmus were removed the improvement was immediate and permanent. Approximately forty-eight of these cases have been examined recently and although it is only a short time since some of them were operated upon, yet they all may be classed as cured, that is, their heart action has returned to normal and increases only slightly upon exertion.



Aside from these series five cases were treated indirectly, that is, attempts were made to eliminate focal infections when present, in order to ascertain whether or not they were the indirect causes of the toxic goiters. In two of these cases infected tonsils were removed, in another an infected Fallopian tube was removed. In the remaining two an exaggerated type of chronic constipation existed. One of these cases was operated upon and an adjustment of the bands and membranes about the ileocecal junction and the ascending colon was accomplished. This patient also had a retroverted uterus which was placed in its proper position. The other case was treated with agar and bran with occasional colonic irrigations.

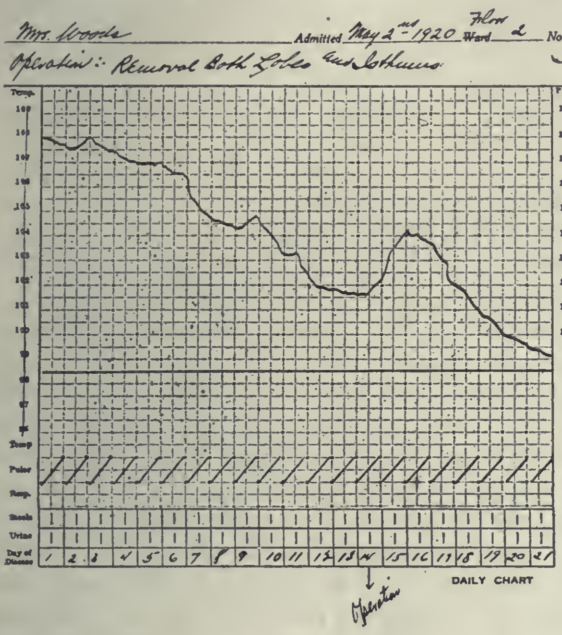
These cases all seemed to improve to some extent, but none can be considered cured. The goiters have not diminished perceptibly and the systemic symptoms still remain, so that thyroidectomy will be necessary.

After reviewing the foregoing series I have drawn the following conclusions and shall offer a few suggestions which I deem valuable.

Reaction following various surgical methods:

I believe that in removing both lobes and isthmus at one operation the resulting reaction is less marked and therefore the post-operative danger of the patient succumbing to a toxemia caused by a sudden release of the colloid material is less likely, than when only one lobe is removed, or one thyroid artery tied. In other words, I believe that the complete removal of both lobes and isthmus at one operation under local anesthesia is not more dangerous than the mere ligation of the superior thyroid artery, other conditions being equal, and I shall attempt to show this with charts which show the pulse curve. These were chosen because of the similarity of the cases as regards blood pressure, kidney function, heart dilatation, etc.

SETON HOSPITAL.



The tabulation following the charts reproduces the pulse rate and basal metabolic rate of the same cases.

I am not placing the foregoing cases as a criterion but I have selected them because of their similarity and in order to show the reactions following the various methods in the same hands under similar conditions.

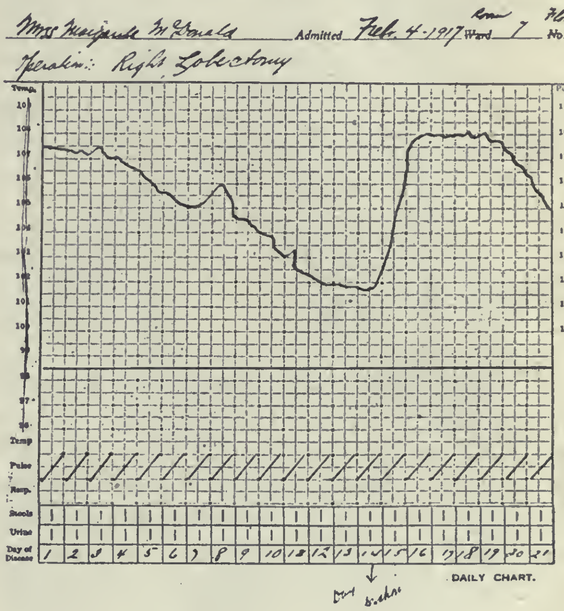
In other words, if it can be shown by sufficient clinical data and study that the total removal of the thyroid is just as safe a procedure as the arterial ligation, then many months of waiting and treatment will be saved the individual patient and I believe that harmful effects which continue to result to the other organs of the body even after two ligations will be avoided.

Sandiford[1] has tabulated twenty-two cases in which the basal metabolic rate after two ligations has averaged plus 39. This rate although greatly reduced is undoubtedly harmful to the human organs when acting over a period of six to eight months, whereas with immediate bilateral lobectomy the basal metabolic rate drops to between plus 5 and plus 16, which is normal.

EFFECTS OF FOCAL INFECTIONS UPON THYROTOXICOSIS.

From the five preceding cases tabulated in which focal infections were found and eliminated we have come to the conclusion that toxic goiters in this respect resemble tuberculous glands, that is, although the increase of biochemical products may be caused by bacteria from focal infections, still their removal does not in itself constitute a cure, because the thyroid itself during these changes has become a focal infection, as it were, secreting its excess products which act as a poison to the body, just as is the case in tuberculous glands, and it must be removed in order to constitute a complete cure.

SETON HOSPITAL.



It has therefore been our practice to remove focal infections when found only as a preliminary to the removal of the thyroid and with no promise of cure, just as we sometimes treat patients suffering with tuberculous glands of the neck with tuberculin preliminary to their removal. This, however, is only our opinion based upon a comparatively few cases, and as clinical experiments dealing with focal infections progress and are more accurately tabulated a great deal may be accomplished along this line of endeavor. The failure to accomplish immediate results with the elimination of focal infections up to this time may be the inability to place one's finger upon the offending focus and to be able to say that this and no other is the focus which is accountable. That patients have been made to undergo innumerable operations of a destructive nature, as the removal of teeth, appendices, colon, etc., without accomplishing the desired results, has long been observed.

EFFECT OF BILATERAL THYROIDECTOMY.

	Before Operation.		About 4 Weeks After Operation.	
Mrs. Woods:	Pulse	B. M. R.	Pulse.	B. M. R.
	118	plus 74	89	plus 20

EFFECT OF RIGHT LOBECTOMY.

	Before Operation.		About 4 Weeks After Operation.	
Miss McDonald:	Pulse	B. M. R.	Pulse.	B. M. R.
	120	plus 63	104	plus 43

EFFECT OF LIGATION OF RIGHT SUPERIOR THYROID ARTERY.

	Before Opertion.		About 4 Weeks After Operation.	
Mrs. B.:	Pulse	B. M. R.	Pulse.	B. M. R.
	130	plus 76	124	plus 60

Dr. Frank Billings[2] has pointed out that it is our duty to build up the resistance of our patients against the organisms already in the tissues of the body even after the true focus has been removed. Even so I think that some improvement should be immediate after the principal focus has been eliminated, if it is to be expected at all.

TESTS DETERMINING THYROTOXICOSIS.

Many tests have been utilized and perfected in the past few years, some of which promise to aid us greatly not only in a more correct diagnosis of each case, but also in determining the proper treatment in the various forms of goiter. Chief among these is the "metabolic test" as made by the Benedict or Haldane apparatus, McCaskey's hyperglycemic test, etc. Of course all of these tests, if thought useful, should be used in order to ascertain the degree of toxicity of any given case, but we should not allow "the tail to wag the dog," that is the surgeon should always refer to his clinical powers of observation and judgment, and to his operative experience, using every useful laboratory test available to aid him in his decision. The basal metabolic rate is unquestionably an improvement over the pulse rate although its determinations in my hands correspond closely to the pulse rate.

SELECTION OF HEMOSTATS TO DETERMINE NECESSITY OF LIGATION IN THYROIDECTOMY.

Many operators "tie off" all of their hemostats while others "tie off" only a very few, "taking a chance" with most of them, or even go so far as leaving many of them *in situ*.[3] By the first method we consume a great deal of unnecessary catgut into the wound, thereby inviting infection and causing a greater reaction in the tissues. By the second method we endanger the patient with secondary hemorrhage or hematomata.

For the past two years we have been using two different types of hemostats in all goiter operations. The types to be used are optional with the individual operator. We use the small Kelly forceps and the large Kocher. Whenever we clamp fascia, or other structures, as muscles, etc., or small oozing points in fat, which we know will not bleed after the clamp is removed, we use the smaller forceps; whenever we clamp an artery or a large vein, or in clamping through the thyroid gland, or in clamping any structure which we know will require tying after the completion of the operation, we use a large Kocher forceps.

It might seem that this would involve a great deal of thought and loss of time; but we have found that we unconsciously pick up the proper hemostat and, if a nurse is passing instruments, that with only slight training she will hand the proper forceps.

In using this method we have found that we save time in knowing which hemostat requires ligature, we prevent the possibility of secondary hemorrhage, and we also prevent the possibility of hematomata following operation. Leaving the clamps following lobe removal as suggested by Bartlett[3] becomes at once impractical because we save an enormous amount of time in knowing which clamps require ligature.

CONCLUSIONS.

(1) Removal of both lobes and isthmus has eliminated in large measure the necessity of preliminary ligation.

(2) Removal of focal infections in itself is not

sufficiently effective in producing a complete cure in thyrotoxicosis.

(3) Basal metabolic rate determination and other tests have proven themselves as definite aids to diagnosis and treatment.

(4) Greater risk can be taken in operating under local than with general narcosis.

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2. Billings, Discussion of Focal Infections by Fontaine, *Journal of the A. M. A.*, Vol. 74, June 12, 1920.

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MAJOR VAGINAL PROLAPSES. DEFINITE CURE BY MEANS OF TOTAL COLPECTOMY.*

Docteur Demarest,
Paris, France.

Under the definition of major vaginal prolapses, I include those which are characterized by complete eversion of the vaginal walls. The vagina, completely exteriorized and everted, forms a sort of infundibulum with its base situated superiorly, and its apex inferiorly, corresponding to the cervix of the uterus, which is more or less effaced. The vagina has undergone a total eversion.

This eversion is encountered:

1\. In women who have undergone a total abdominal hysterectomy;

1\. In women who have undergone an isthmic hysterectomy (which title I prefer to those more frequently employed for supra-vaginal or subtotal hysterectomy).

3\. In women whose genital organs have undergone no surgical mutilation. These cases form the class of major prolapses, the third degree prolapses of the classic authors.

The essential factor in all these cases is the complete eversion of the vaginal mucosa; and it is this factor which must be attacked.

Anatomically, the following points must be considered:

1\. The eversion of the anterior wall of the vagina, which always carries with it the bladder; the lesion is most marked anteriorly; the bladder descends with the vaginal wall, so that it is practically outside of the pelvic cavity. When the bladder is distended, the vaginal protrusion becomes more marked. A sound introduced into the bladder, and directed towards the fundus of the bladder, passes in a direction exactly opposite the normal. The functional troubles which result from the descent of the bladder vary from partial retention to complete incontinence. Retention predisposes to infection, and cystitis to the formation of vesical calculi.

2\. The eversion of the posterior wall of the vagina may be accompanied by the descent of the anterior wall of the rectum (rectocele) but the two organs are less intimately connected than the bladder to the anterior wall of the vagina. The cellular tissue of the recto-vaginal partition is more lax, and adapts itself to the movements of the organ during the act of defecation. During operations the separation of the posterior vaginal wall is much more easily performed than that of the anterior wall, especially in the lateral portion. Although there is adhesion in the median line, low down, this adhesion is always less marked than anteriorly.

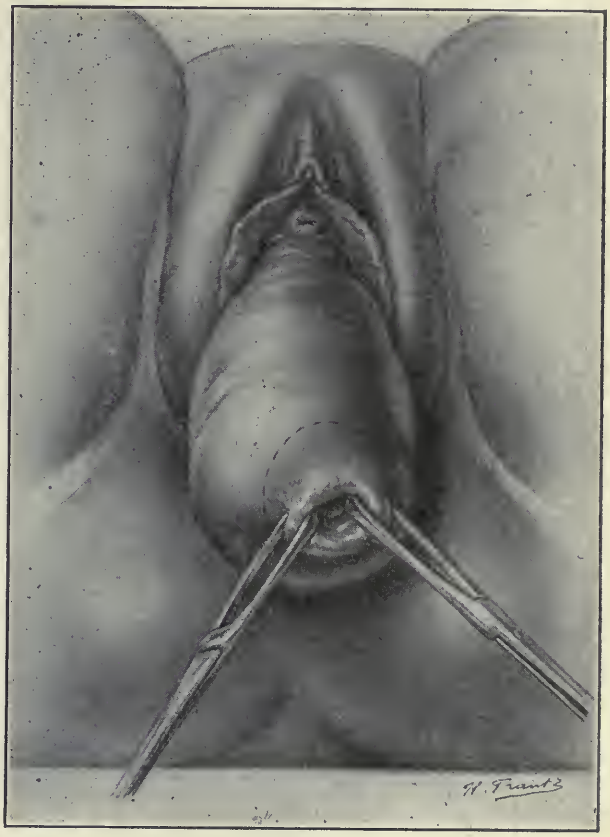

Figure 1

In addition, the rectal supports are stronger than those of the bladder, due to the pubo-rectal fibers of the levator ani, which are intimately connected with the rectum.

The important factors, then, are the less marked displacement of the posterior wall of the vagina and rectum, and the existence of the muscular bands of the levator ani, which are often only fibrous but nevertheless useful bands.

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*Manuscript received in French.

3. From the internal aspect of the ischio-pubic border, the vaginal walls descend towards the cervix uteri, if it is present, or towards the vaginal cicatrix, which is present if the patient has undergone a total hysterectomy.

Neither cervix nor cicatrix will be located exactly in the center of the funnel which is formed by the everted vaginal walls. The more marked unfolding of the anterior wall, accounts for the fact that the cervix or vaginal cicatrix approaches nearer to the anal than to the urethral orifice.

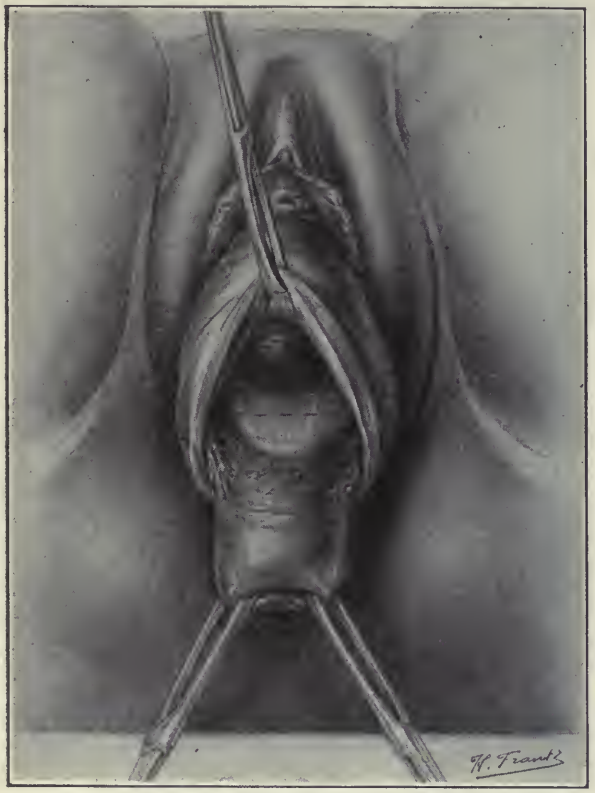

Figure 2

The cervix or the cicatrix, if the lesion is of long standing, may be the seat of more or less extensive ulcerations, caused by the constant friction to which it is subjected.

4. In the vaginal funnel, descends the peritoneum, which after leaving the bladder is reflected upwards on the anterior wall of the rectum in cases where the uterus has been removed. In these cases there is an abnormally developed cul-de-sac of Douglas. In those cases in which the uterus is present, the peritoneum also descends much lower than normally. In old women the body of the uterus has undergone some atrophy, which diminishes its volume; and the smallness of the uterus is masked by the elongation of the cervical canal. The elongation of the cervical canal is a constant lesion which must be recognized. It is not rare to encounter cervices more than six to eight cm. in length.

The uterus remains in the pelvic cavity, its displacement being relatively slight, because it is fixed posteriorly by the utero-sacral ligaments, laterally by the tubes and ovaries which in these cases become true means of support. These facts are in favor of the theory that we are dealing primarily with a descent of the vaginal walls, which are insufficiently supported. In genital prolapses it seems that the uterus follows only in a very slight way, the descent of the vaginal walls.

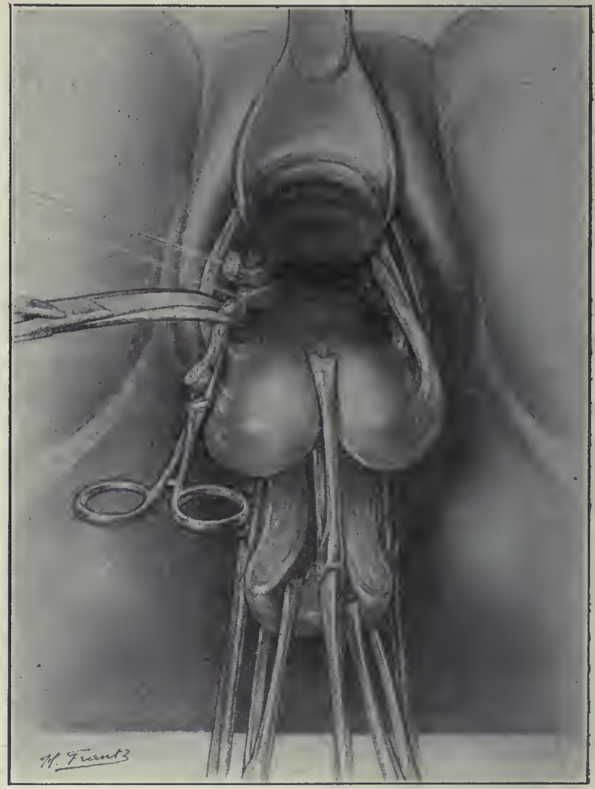

Figure 3

The uterus is situated in the vaginal funnel in relation, anteriorly, posteriorly, and superiorly, with the intestinal coils which descend into the peritoneal cul-de-sac. I have never encountered adherent loops. I have never seen the condition described by Tuffier, namely the existence of a constriction, between the mobile part of the vaginal wall, represented by the everted portion, and the fixed part of the vaginal wall represented by a small area in the vaginal wall adherent to the internal aspect of the levatores. According to Tuffier this fixed portion undergoes no descent. At the junction of the fixed and mobile portions, there is formed a sort of constriction which may be the site of strangulations.

In only a single instance that I can remember was the reduction of the prolapse accomplished with difficulty. At the moment of the reduction, there was noted the characteristic intestinal gurgle, and as soon as the vaginal hernia had been reduced the patient complained of severe abdominal pain and nausea, which disappeared as soon as the vagina had reassumed its abnormal position. At the operation nothing approaching the condition described by Tuffier was found.

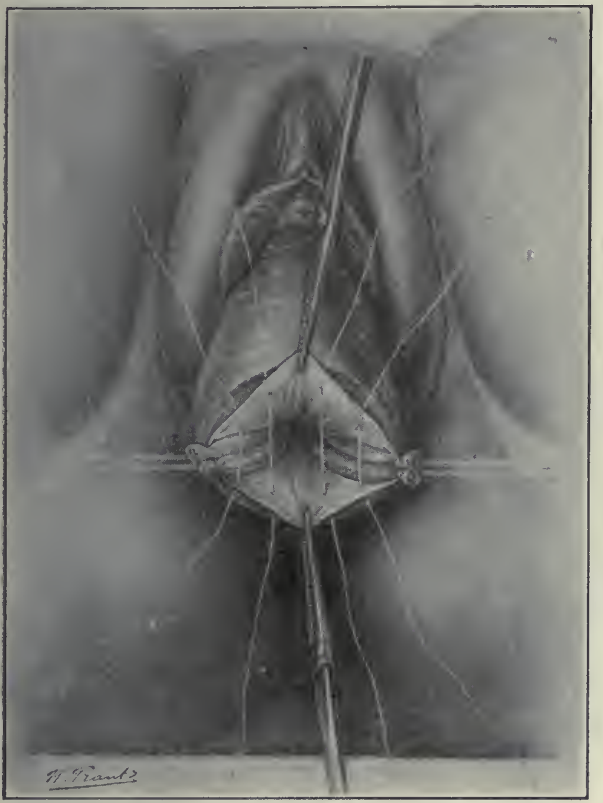

Figure 4

Clinically, vaginal eversion requires no unusual study. The patient should be examined in the gynecological position, in order that the total prolapse may be viewed, evenly and smoothly, with all its folds rolled out. One notes also the protrusion of the cystocele, the cervix uteri with its orifice more or less dilated, and its surface covered with ulcerations extending on to the vaginal walls. The patient is told to bear down in order to accentuate the perineal tumor. The tumor may be percussed to affirm the presence of intestinal loops in the hernia.

Reduce the hernia by replacing the vagina in its normal situation, noting the intestinal gurgle which is produced in the course of reduction, which may be painful, as noted above. Pass a sound into the uterus. The apparent lengthening of the uterus due to the elongation of the cervix should be remembered.

Rectal examination will determine the exact relation of the anterior wall of the rectum to the vagina. The amount of vesical retention may be determined by aseptic catheterization. Lastly, the patient, usually of advanced age, should have the benefit of a complete and thorough physical examination, in order to determine the presence of grave renal or myocardial lesions, which would offer contra-indications to operative interference. Operation should not be performed until the cervical ulcers have undergone careful disinfection for ten to fifteen days.

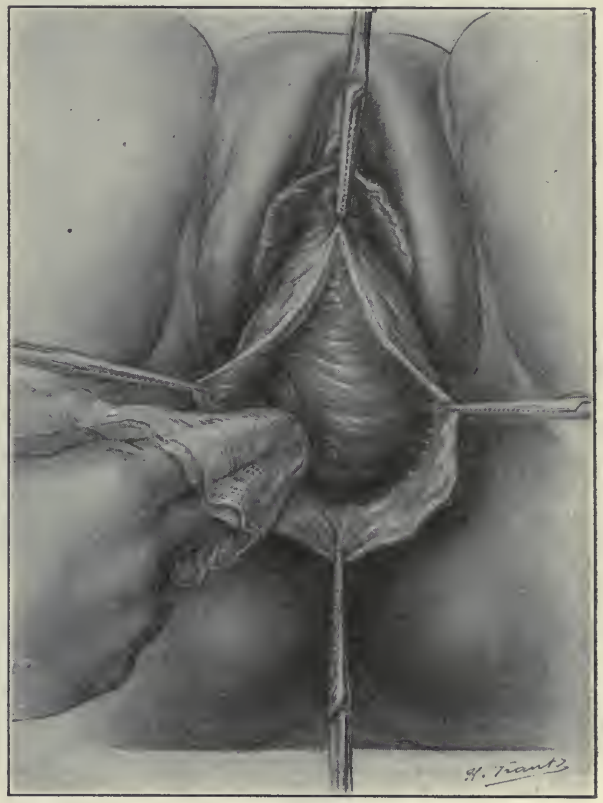

Figure 5

The only treatment for eversion of the vagina is total colpectomy, to which is added complete vaginal hysterectomy, when the uterus is present.

The condition is usually met with in aged women, to whom the procedure is not objectionable. Total colpectomy is an operation practically without danger, even when preceded by a vaginal hysterectomy. The mortality is nil. The remote results are remarkable.

During the last five years I have performed ten total colpectomies, all except one on women over sixty years of age. One was under fifty, but submitted to the operation because of the great inconvenience caused by the condition. This patient had had two previous anterior colporrhaphies, and was willing to submit to any procedure that would bring relief. The technique that I employ is as follows:

First Step: Vaginal hysterectomy or cervicectomy, according to whether the uterus or only the cervix is present.

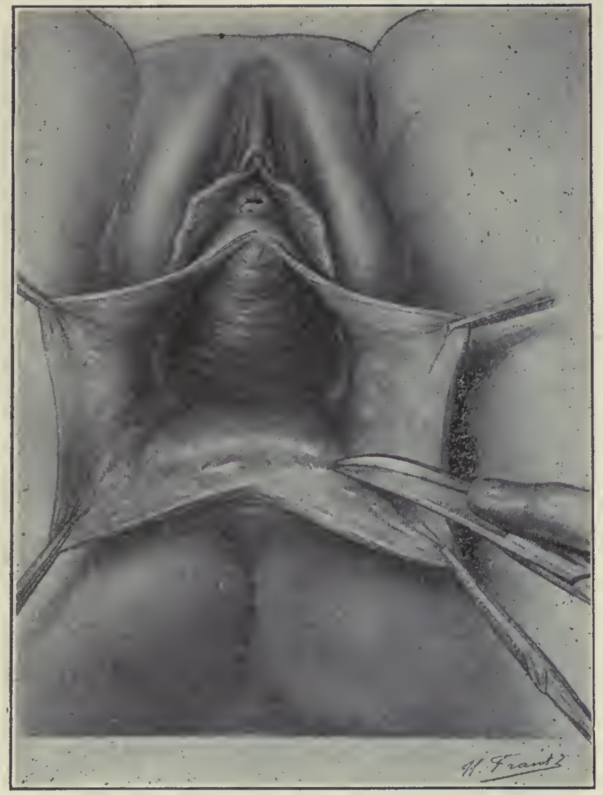

Figure 6

Second Step: Colpectomy.

The vaginal hysterectomy differs from the usual operation by its great facility of execution.

The vaginal walls are painted with tincture of iodine.

Hysterectomy.

1. Circular incision of the vaginal mucous membrane a little above the lips of the cervix (Fig. 1). The plane of cleavage between the uterus and bladder is located, and these organs are separated up to the peritoneal reflection (Fig. 2).

2. In order to open easily the peritoneal cul-de-sac, I divide in the median line the anterior wall of the uterus up to the fundus (Fig. 3).

3. Section of the superior portion of the broad ligament close to the uterus on either side. The uterus is then easily revolved forward and the cul-de-sac of Douglas is exposed (Fig. 3).

4. Dissection through the posterior vaginal incision, so that the cul-de-sac of Douglas is exposed in its entirety.

5. Section of the uterine pedicles, which are seized and cut between Kocher clamps.

This completes the vaginal hysterectomy. Two solid ligatures are placed on the pedicles. The breach in the peritoneum is easily closed, when the two surfaces are approximated (Fig. 4). This suture should be as high as possible. With the closure of the peritoneum, we pass to the second step of the operation:

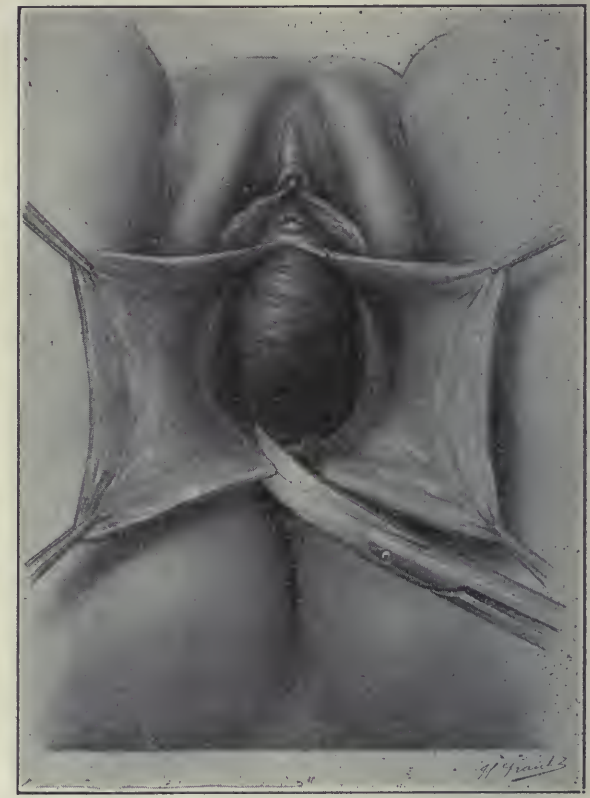

Figure 7

Colpectomy. Median incision, longitudinal, down the entire length of the mucous membrane of the anterior vaginal wall. Having found the plane of cleavage, the mucosa is separated gently upwards to about one cm. behind the urethra, laterally to the full extent of the mucosa (Fig. 5). Below, the separation is a little more difficult in the area corresponding to the pericervical tissue. The separation below may be accompanied by considerable oozing, increased by the fact that circular incision has been made close to the cervix.

To carry this incision further away from the cervix might seem a simple expedient to prevent this inconvenience, but in practice such an incision might endanger the bladder.

With the bladder liberated and the separation completed on either side, the same procedure is performed posteriorly. Posterior median incision, and separation of the posterior vaginal mucous membrane almost down to the fourchette (Fig. 6). Here again the oozing is most abundant near the cervix. Nothing remains to be done except the resection of the vaginal wall (Fig. 7), leaving enough tissue for vertical suture without much traction.

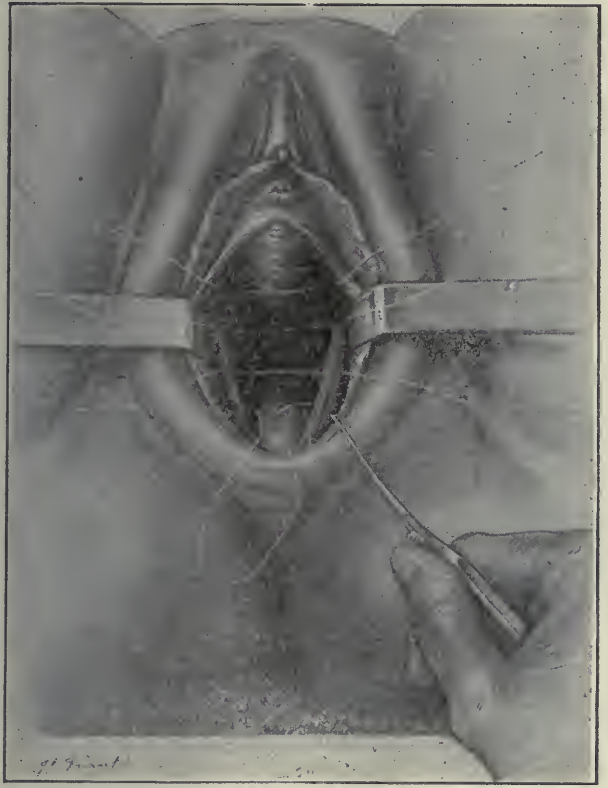

Figure 8

In all cases, before completing this suture, I believe it to be a good plan to liberate the fibromuscular bands, which form the inner fascicles of the levatores, and to suture them together with catgut stitches (Fig. 8). This procedure is fairly easy posteriorly, where the muscular fibers are more supple and movable. Anteriorly the fibers are less thick, and the sutures have a tendency to tear through.

Whatever the value of this procedure may be, and it is dependent to some extent on the elasticity of the levator fibers, I believe that it should always be attempted, but it would be an error to state that it is essential to a good result.

The levatores having been sutured, the edges of the mucous membrane are sutured in the median line, and a drain is inserted below (Fig. 9). A flat dressing is applied and if there is much tendency to bleeding, a catheter, to obviate efforts to urinate.

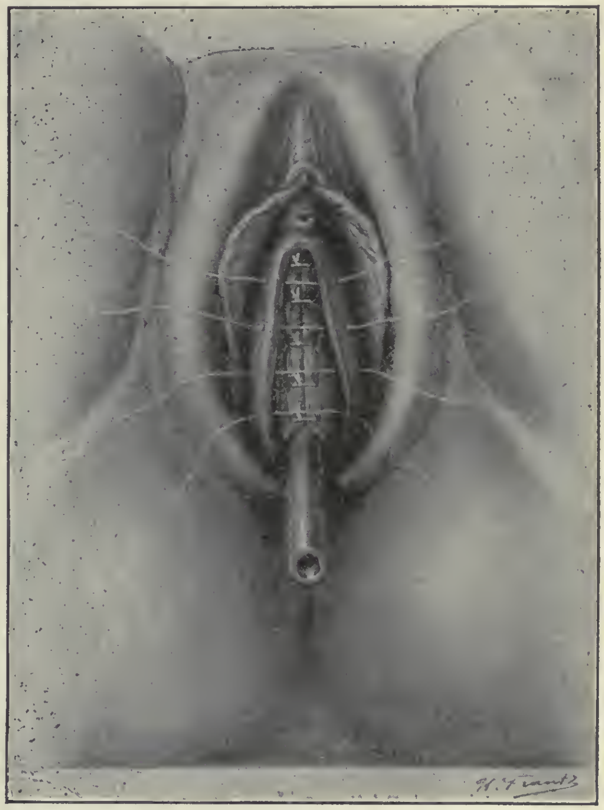

Figure 9

After-care and Operative Results. These are most simple. Irrigate gently morning and evening, and after urination if the patient is allowed to void. The temperature rises slightly during the second and third days, from the separation of the sloughs; there is always some tissue eliminated from the area between the peritoneum the vaginal mucosa, from which a foul smelling oozing may occur. This may last eight days or more. The odor and discharge may be diminished by douches of peroxide of hydrogen. The patients are out of bed between the fifteenth and twentieth day, comfortable, and happy to be freed from an annoying infirmity.

I have never had any local or general complications.

Cancer of the Rectum.

Don't attach undue importance to a patient's history of "piles," "indigestion," or "constipation," but insist upon a rectal examination in every instance.

Don't assume that the passage of bloody or slimy stools is due to dysentery. There may be cancer.

Don't assume that bleeding from the rectum points to piles. It may be due to cancer.—Charles J. Drueck in the *Medical Record*.

LATE SYPHILIS OF THE RECTUM.

Charles J. Drueck, M.D.,
Professor of Rectal Diseases, Post-Graduate Medical School and Hospital, Rectal Surgeon to Peoples' Hospital,
Chicago, Ill.

Syphilitic Stricture of the Rectum.—Just how frequently syphilis causes stricture of the rectum is a mooted question. Some authors claim that all non-malignant strictures are syphilitic, while others are equally positive that strictures result from any ulcerative changes regardless of type or etiology. At any rate we do find that syphilitic stricture may follow any syphilitic ulcer as chancre, secondary ulcer, or broken-down gumma, and that it has certain peculiar characteristics. The Wassermann reaction will help us to decide definitely for or against lues in a given stricture; but clinically, it is sometimes impossible to say that a given stricture is or is not syphilitic. Of course, once ulceration occurs and septic infection is added, the picture is so confused that a microscopic examination of a piece of the tissue may be necessary for diagnosis. The chancroid, though not syphilitic, is a close cousin and frequently produces a very serious form of stricture.

The discharge of blood, mucus or pus, of which many syphilitics complain during the secondary stage, is often attributed to the mercurial remedies administered and the probability of the presence of mucous patches or ulcers is forgotten. We do not see stricture patients during the latent or infiltrating stage because they do not consult a physician until they are suffering from stenosis of the rectum. Histologically we find in the syphilitic stricture a chronic inflammatory formation about the blood-vessels and within their walls. Especially is this found in the arteries. This obliterating endarteritis is the same as found in any syphilitic lesion.

The infiltration of the mucous membrane about the ulceration or about the minute gummatous deposits in the mucous membrane imparts a stiff, rough, leathery character to the rectal wall and thereby limits and lessens the distensibility of the rectum. A sanious or muco-purulent discharge fills the rectum. Later when the ulcer may have healed the mucous membrane remains dry. The cicatrix is blue-white, dense and hard, and usually presents some ulceration at its upper extremity. Syphilitic ulcers are inclined to follow the course of the lymph-and blood-vessels, and, as that direction in the rectum is lengthwise the contracted portion is usually tubular instead of sharply annular as we find in the inflammatory stricture. This condition may extend from the anus to the colon although most syphilitic strictures occur from 1 to 3 inches from the anus. The more recent part of the stricture, with its infiltration and proliferation, is frequently the most obstructive. Ulceration may also be found below the stricture and from these ulcers fistulæ lead to perirectal abscesses or open externally on the skin or into the vagina or urethra.

When decided stricture occurs low in the rectum constipation alternates with diarrhœa and the passage of ribbon-shaped or broken stools.

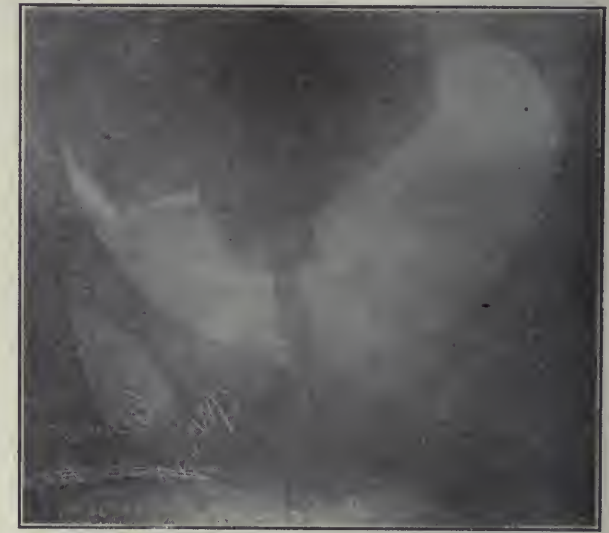

Fig. 1—Syphilitic stricture of the rectum ending abruptly, thus simulating cancer.

Differential Diagnosis. The differentiation of syphilitic from tuberculous, dysenteric or malignant strictures is most important. Syphilitic strictures usually are long, funnel-shaped contractions with blue-white cicatrices about the ulcers. The edges of the ulcer are never undermined but rather crater-like. In some instances these dense white scars can be plainly seen through the speculum in the tissues of the rectum just below the stricture.

Figure 1 shows the tightly contracted rectal lumen of a syphilitic stricture. This woman, case C-8, contracted syphilis seven years ago. For the past year she has had pain in the rectum and a purulent, sanious discharge. The bowels are always constipated. On digital examination the finger, at a distance of one and one-half inches from the anus, comes to a solid impassible stricture. The rectum below the stricture is hard and nodular. There are several fistulæ leading into the vagina and others out onto the skin. These are tender as the digital examination is made. The patient has been on intensive antisyphilitic treatment for some time, and, although her general condition has much improved, the obstipation is still a serious matter and an abdominal anus has been advised.

Not all syphilitic strictures are long and pencil-like in character. Sometimes the lesion is limited to a small area and the stricture is more annular in character, as in figure 2. Here the differential diagnosis by the physical findings was not possible.

The patient was first seen when acute obstruction had developed and a laparotomy was performed. When the abdomen was opened and the sigmoid was lifted up it was noted that the hyperplasia seemed largely on one side of the bowel. Resection was performed and subsequent microscopical examination showed that the lesion was not malignant.

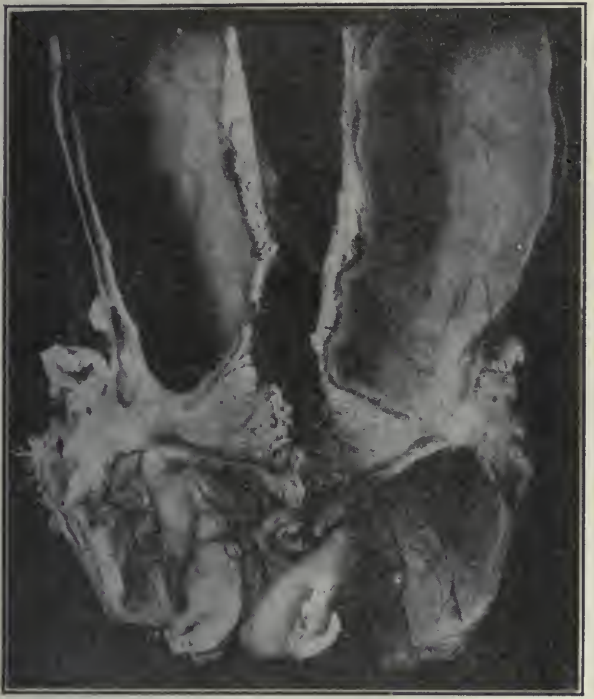

Fig. 2—Syphilitic stricture of the sigmoid.

As has been mentioned above, some of the obstructive symptoms result from the inflammatory swelling about the ulcers. This infiltration and swelling of the mucosa is not syphilitic but rather a reaction to the local streptococcic infection. As the luetic endarteritis subsides gummatous deposits resolve or the ulcers heal under treatment, the swelling of the mucosa lessens and sometimes the obstruction is relieved. Case C-5 presents such a condition. About one year ago this woman began to have constant pain, of a cutting character, in the rectum, with tenesmus. Since then she passes blood and pus almost every day. During this time she lost fifteen pounds in weight. She is 26 years old. A positive Wassermann reaction was obtained. She was placed on antisyphilitic medication and immediately began to improve. Her appetite returned. She had formed fecal masses which were evacuated without suffering and she improved in general physical appearance although the roentgenogram of her rectal stricture was unchanged. In this case the upper end of the stricture is very different from that of figure 1. The upper limit of the strictured portion of the rectum ends abruptly and the normal elastic rectum continues. But the distinctly tubular stricture will be noted. Nothing surgical was attempted, the woman improved steadily until she became quite comfortable and finally left our observation.

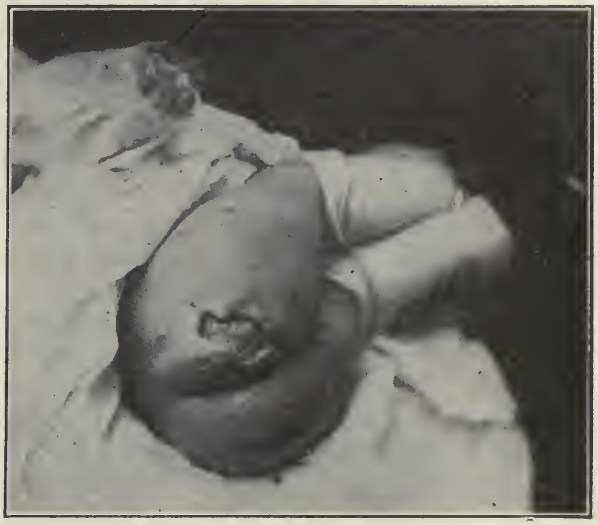

Fig. 3—Congenital syphilitic ulcer.

The very irregular outline of the upper end of the stricture is very suggestive of the ragged outline obtained in roentgenograms of cancer of the rectum.

Prognosis. The prognosis in all strictures must be guarded until the patient has been under treatment long enough to weigh the various factors in each case.

The inflammatory tumefaction which is a part of the endarteritis will subside under antisyphilitic treatment. The leutic ulcers also will heal and this may relax the obstruction sufficiently to make the patient comfortable and perhaps relieve the constipation. Such a patient is symptomatically cured.

Where the obstruction results from cicatrical contraction as in figure 2 relief is not obtained and an abdominal anus or a resection may be required at any moment.

When the stricture is low in the rectum and the fibrosis involves the sphincters, atrophy of those muscles frequently produces fecal incontinence.

Congenital Syphilis. Many of the manifestations of congenital syphilis appear about the anus of the young infants and may be overlooked or mistaken for simple skin irritations from lack of cleanliness. The earliest manifestations of syphilis in babies is an erythema or dermatitis about the anus accompanied by shallow fissures. The anal mucous membrane is also fragile and brittle and the fissures are easily produced by dilating the anus. If untreated the ulceration spreads. The skin surface becomes copper colored; and later is thickened and raised and emits a thin, sero-purulent, and very fetid discharge. The little fissures may extend into the anal canal and may be secondarily infected. As these ulcers or fissures heal they leave radiating scars (so-called rhagades.) All of this change may occur within the first few months of life. It may begin within the first week or it may not evidence itself until the baby is two months old, and may be mistaken for the chafing that results from contact with feces and urine, but the latter condition is never associated with the numerous small, shallow anal fissures found in syphilis. (Figure 3).

Treatment of Tertiary Syphilis. The treatment of tertiary syphilis of the anus and rectum requires special management of the local conditions. Every effort must be made to prevent septic infection. The patient should be put to bed and the bowels moved regularly and also irrigated. Ulcers should be cauterized. If the ulceration is extensive and the discharge profuse, the sphincters should be dilated to assist drainage.

The systemic treatment consists in the administration of full doses of potassium iodide, preferably given in milk or essence of pepsin, increasing up to 60 to 100 grains daily, given in small amounts frequently repeated. Mercury should be exhibited by inunction or hypodermatic injections, because when given by mouth it sets up a teasing diarrhœa. Hypodermatically, I think I have had the best results with salicylates of mercury. Every patient should also be given a course of intravenous treatment (arsphenamine.)

Locally, ulcers should be carefully and persistently treated. Daily dilating does much to reduce the local capillary congestion, but it must be carefully performed for fear of lacerating the mucosa or even tearing through the bowel wall. These strictures must not be cut as they invariably fill up with granulations which contract further. Their pathology is not wholly syphilitic but has added septic infection; and posterior proctotomy, excision of the diseased field, or the construction of an abdominal anus may be necessary.

30 North Michigan Avenue.

A FURTHER REPORT ON THE AUTHOR'S OPERATION FOR URETHRAL STRICTURE.*

Maximilian Stern, M.D.,
New York City.

Since my publication of "A Plastic Operation for the Cure of Urethral Stricture" (*Journal of the A. M. A.*, January 10, 1920) numerous questions have been put to me concerning the field of application of this operation, its advantages over palliative measures, and the late results to be expected. With the hope of establishing a place in surgery for this operation, I am anxious to answer these questions and to prove my contentions by explaining the rationale of the operation and citing a few case histories. It is therefore my purpose in this paper to discuss these three points, merely repeating a description of the operation by means only of illustrations and legends.

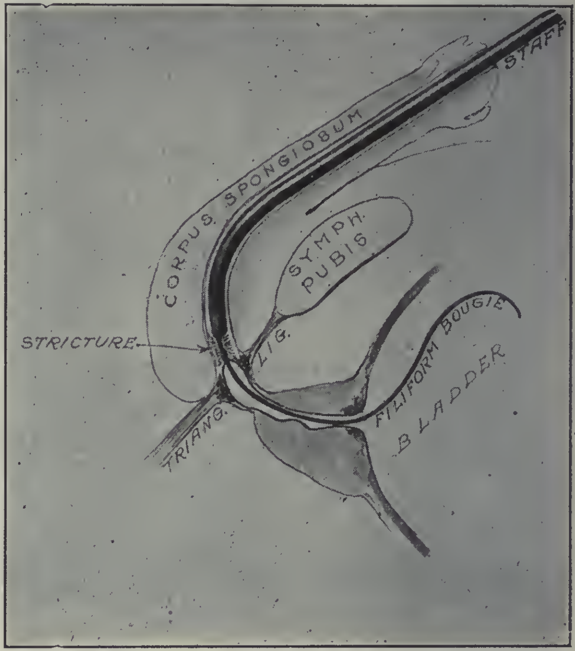

Fig. 1—Diagrammatic representation of stricture at bulbomembranous junction; staff in urethra arrested at stricture; filiform through stricture into bladder. Note the corpus spongiosum overlying the stricture and attached to superficial layer of the triangular ligament.

The chief points upon which differences of opinion seem to center are:

First: The advisability of surgery at all. This question probably arises out of the inadequacies of external urethrotomy. When we consider the conditions under which that operation is performed and the pathology of the tissues concerned, it is not to be wondered at that no permanent results are obtained. The cicatrization, if anything, is aggravated and dilatation becomes more imperative and difficult. Through the usual small vertical incision traversing the corpus spongiosum the field is bloody; and in the event of the operation being performed without the aid of a filiform or guide through the stricture the bladder end of the urethra is often difficult of recognition, resulting at times in the causation of a false passage to the bladder. The benefits are but transient; the patients ordinarily after an operation of magnitude believing that they are well, remain away and receive no treatment until the stream again becomes very much attentuated or until acute retention ensues, thus necessitating another operation. External urethrotomy is generally performed as an emergency measure, but does not meet the requirements of an emergency. It is also questionable whether such an emergency ever really exists, since no case of bladder rupture from retention due to stricture has ever been reported and it is well known that when these patients are given hot sitz baths, sedatives and rest, they are soon able to empty their bladders and hereafter may receive palliative treatment. Ordinarily it is not the stricture itself that causes the retention but a superimposed inflammation, and this when treated palliatively subsides and leaves a sufficient lumen for the urine to dribble through.

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*Read before the Harlem Medical Association, New York, March 3, 1920.

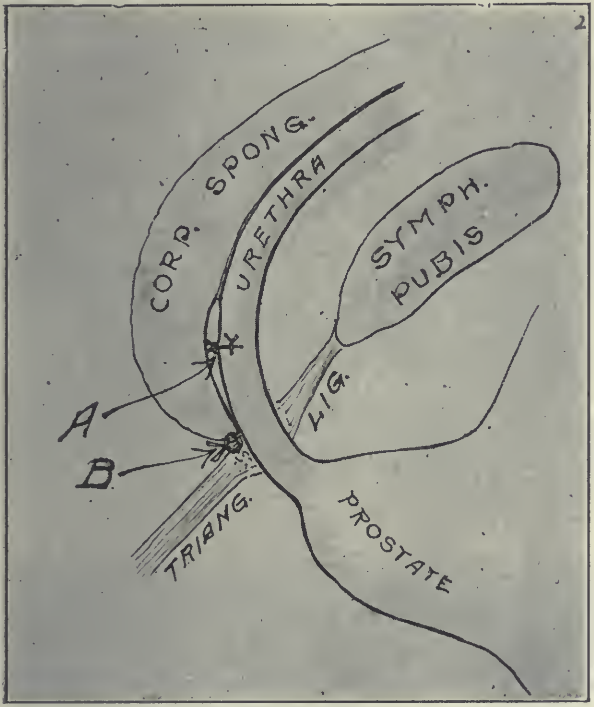

Fig. 2—Diagrammatic representation of finished operation: A, stricture excised and sutures in place; B, corpus spongiosum replaced over urethra and sutured.

There are, however, instances in which it is highly desirable to give the patient complete and immediate relief from his vesical urgency and insure him undisturbed sleep. These patients are in an anxious and desperate condition, incidental to many sleepless nights and to the toxicity of impaired renal function. It is in such cases that external urethrotomy is contra-indicated and cystotomy is preferable. A short gas-oxygen narcosis only is required—rather than ether, which is strongly contra-indicated in cases of this type. The urethra receives no further damage and is more amenable to treatment or an operation logical to a cure than one upon which a linear scar has been inflicted. The value of cystotomy is more fully discussed under the heading of preoperative preparation.

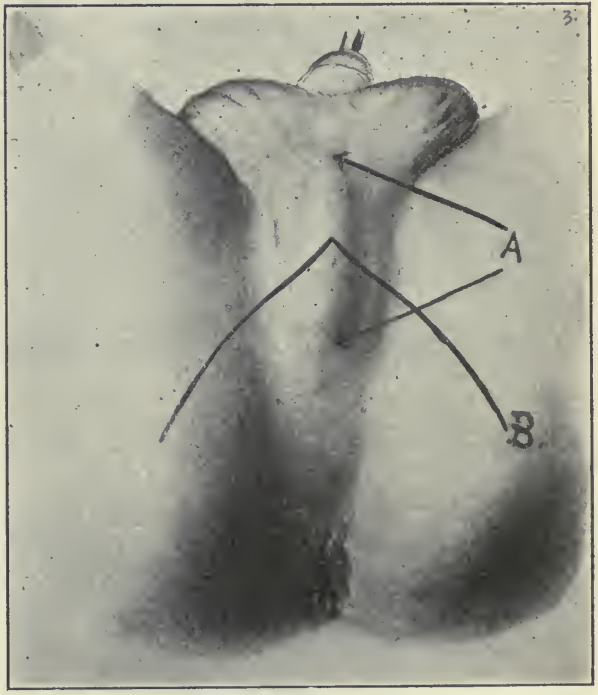

Fig. 3—A, bulging caused by staff in urethra, the lower arrow corresponding to beak of staff at stricture; B, inverted V-incision, its apex well above stricture.

Second: The question of the advantages of my operation over palliative procedures has been strongly urged from various quarters, and I am convinced that the *indications* for surgical treatment have not received due consideration for the reason that it has always been instituted only as an emergency measure. While palliative measures, when carefully carried out, do in rare instances yield some more or less lasting benefits, it is generally conceded that the majority of cases are not of this variety. The largest part of all stricture

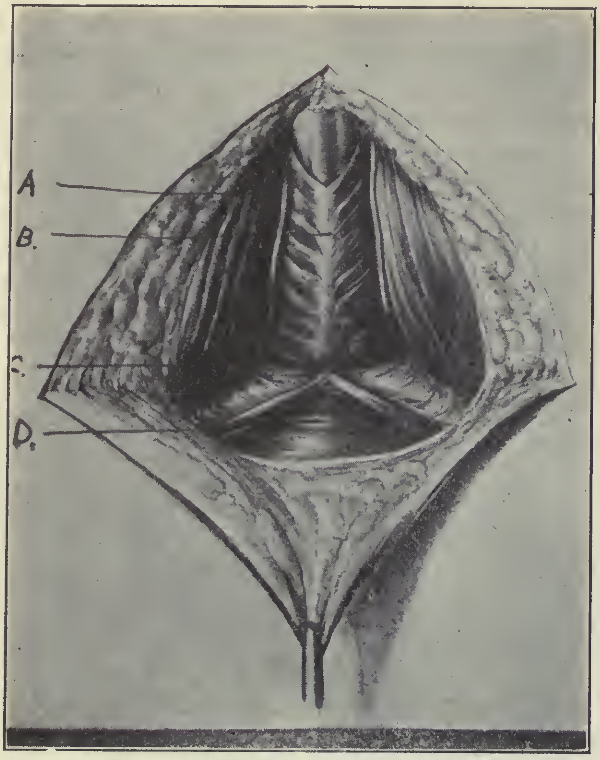

Fig. 4—Skin flap turned down, exposing structures overlying corpus spongiosum; A, ischio-cavernous muscle; B, bulbo-cavernous muscle; C, junction of the superficial transversus perinei and bulbo-cavernous muscles on corpus spongiosum; D, levator ani muscle.

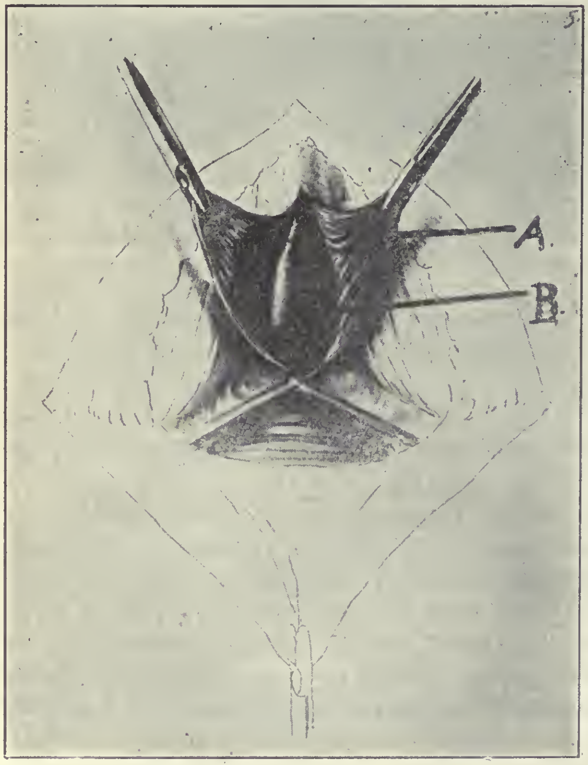

Fig. 5—A, bulbo-cavernous muscles separated and held apart, permitting corpus spongiosum; B, to protrude.

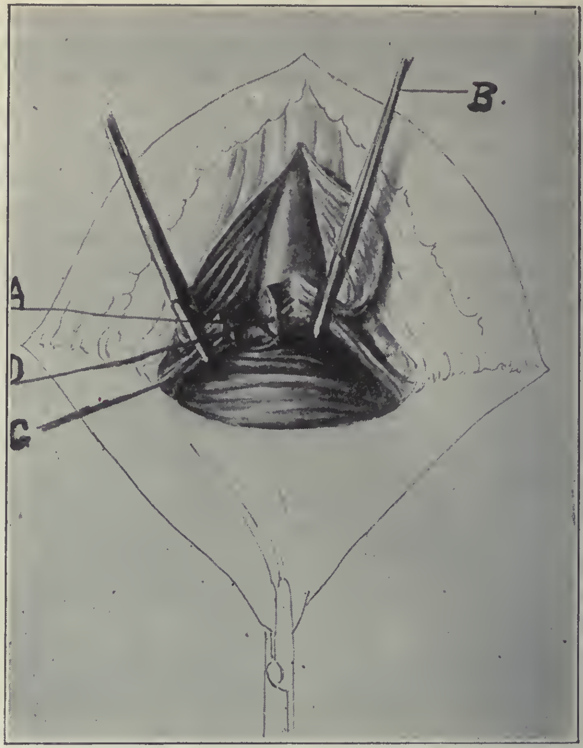

Fig. 6—A, clamps grasping junction of bulbo-cavernous and superficial transverse perinei muscles near their atachment to corpus spongiosum; B, right side severed, exposing C, superficial layer of the triangular ligament; D, muscle stump remaining attached to corpus spongiosum.

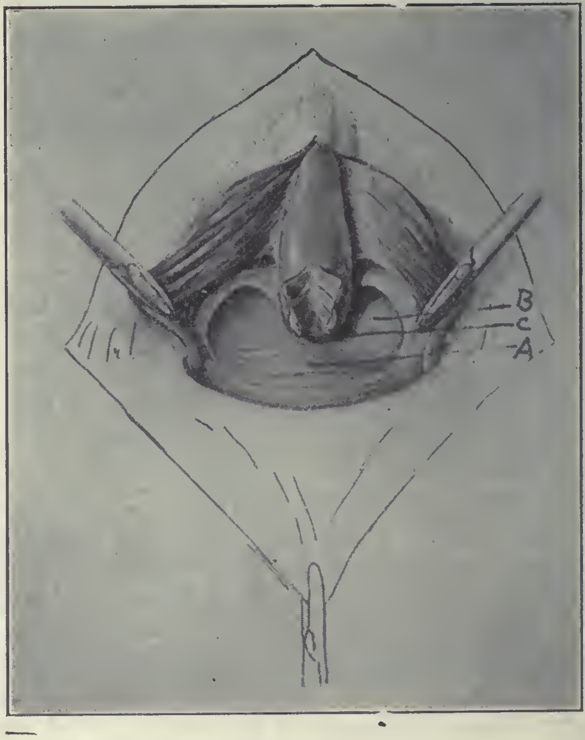

Fig. 7—A, levator ani; B, superficial layer and triangular ligament; C, attachment of corpus spongiosum to triangular ligament.

cases are traumatized by instrumentation and are eventually so badly cicatrized as to require surgical intervention.

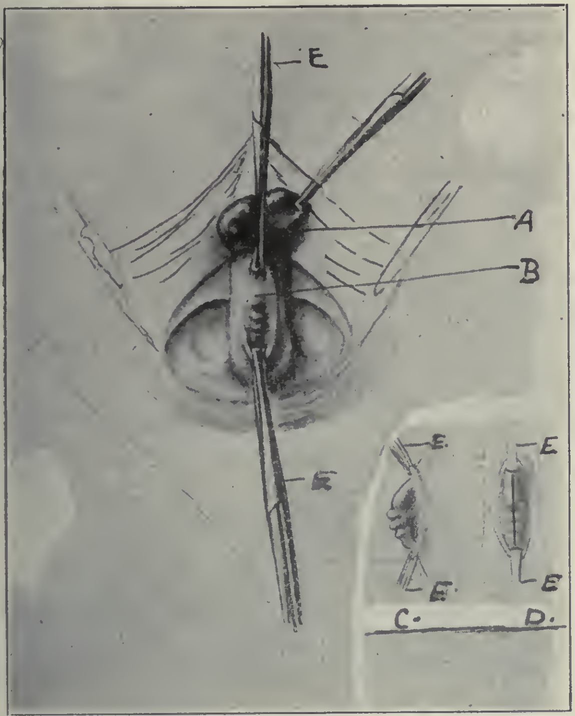

Fig. 8—A, corpus spongiosum elevated, exposing urethra; B, beak of staff engaged in stricture in urethra, throwing it into folds; C. same—lateral views and direct; E, Allis clamps placed above and below stricture and line of incision.

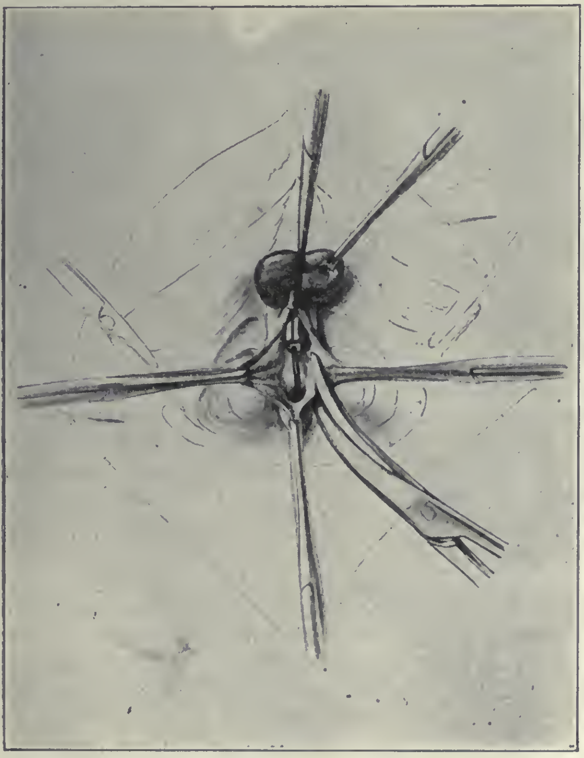

Fig. 9—Urethra opened; staff and filiform exposed; left stricture-bearing flap being removed.

With a surgical procedure that may logically be expected to effect permanent cure, insofar that sufficient and lasting patency of the urethra is assured,

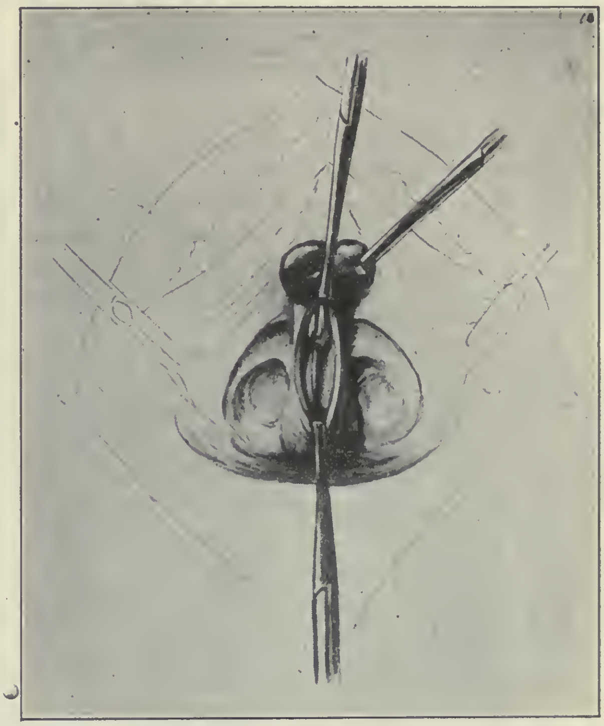

Fig. 10—Aperture in urethra after removal of stricture tissue.

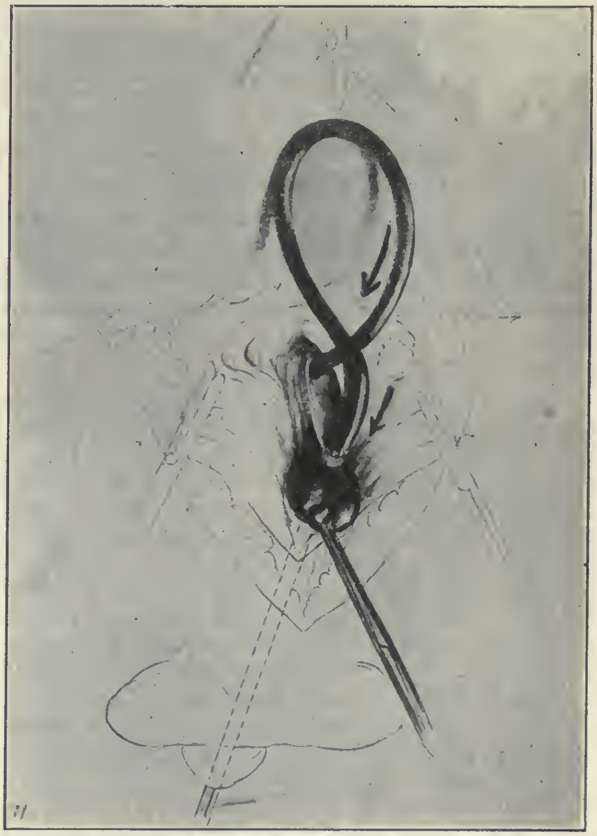

Fig. 11—Soft rubber catheter inserted into bladder; open end of catheter slipped over beak of staff about to be drawn up through urethra.

I am convinced that its field of application should be extended so as to include all cases except those which yield exceptionally to palliative measures. It does not seem justifiable to await the incidence of extreme symptoms, such as extravasation and abscess, not to mention those arising from a co-existing nephritis.

Third: The question of late results: This can best be answered by a few typical case histories. In all, there have been ten patients operated upon to date by this method, all of whom seem to have a permanent urethral lumen of sufficient caliber; in six of these cases the operation was performed more than a year ago. Two typical histories will suffice to illustrate their usual course:

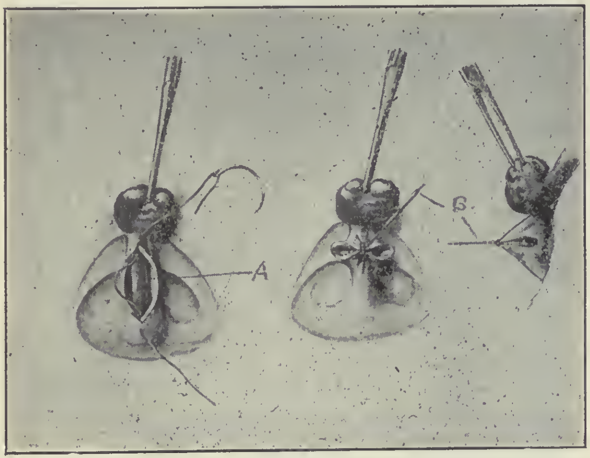

Fig. 12—A, catheter in urethra; first suture placed for approximation of upper and lower angles of wound; B, suture tied.

Case I. J. B. K., admitted to the Broad Street Hospital, November 25, 1919, complaining of a great deal of difficulty in voiding—being able to empty his bladder by a mere dribble of urine and with much effort. The family and past history irrelevant.

Fifteen years ago, while playing football, the patient was kicked in the perineum, following which injury a swelling appeared; this was treated with local applications and cold compresses. After a week's treatment, the local condition cleared and he was not troubled until one year later, when he noticed a little difficulty in starting to urinate. Sounds were then passed once a week for three months. He then went without treatment for two years, when the difficulty in urinating reappeared and he again reported for treatment. This time he was treated by the same physician for about three years, having sounds passed once every two to three months. About five years ago he had a great deal more difficulty in urinating than ever before, and an internal urethrotomy was done. This did not give the patient much relief. For the past five years he has been going from one physician to another, up to this date when he reports at the hospital with great difficulty in even dribbling urine—at no time having had acute retention.

Examination: Head, negative; heart and lungs, surgically competent; abdomen, no areas of rigidity nor tenderness present excepting over the bladder region, where there is a slight degree of rigidity and tenderness; perineum, several infiltrated areas and one sinus discharging urine. A cartilage-like urethra can be felt, extending from the perineum to the meatus.

Treatment: November 28, 1919, a suprapubic cystotomy was performed and the patient was permitted to rest in bed for two weeks, during which time suprapubic drainage was maintained. The infiltrated areas were absorbed and the urinary sinus closed spontaneously.

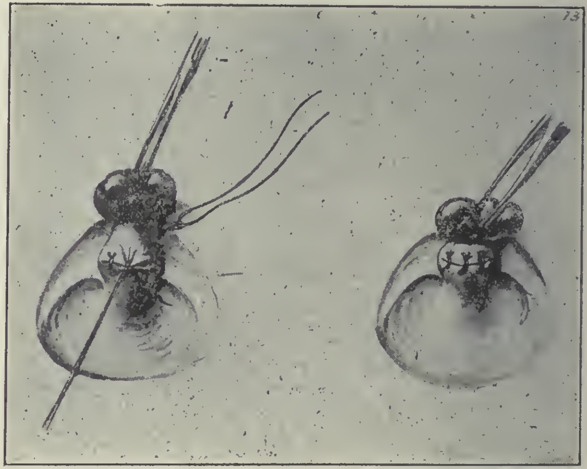

Fig. 13—Urethral repair completed.

On December 10, 1919, an internal urethrotomy was performed, following which the diagnosis of stricture at the bulb was confirmed. The patient was again sent back to bed and permitted to recuperate, during which time argyrol was instilled into the urethra.

On December 22nd, the author's plastic operation was performed without difficulty.

On December 24th, the urethral catheter was removed, the urethra being irrigated during this procedure with boric acid solution. A fresh catheter was inserted. On the third day following the last operation the catheter was removed and the patient was catheterized every six hours.

The following day he was permitted to void.

January 2, 1920: Wound dressed. Healed by primary union.

January 5: A sound, No. 28, was passed without difficulty.

March 1: Urethra admits 28 F. easily.

Sufficient time has not elapsed to prove end-result, but this case seems to illustrate the conduct of one presenting every difficulty.

Case II. Mr. R., age 32; admitted to the Broad Street Hospital on September 3, 1918, with acute retention of urine. He was put to bed, given morphine, and an instillation of apothosine locally. With the aid of the author's urethroscope, the stricture was catheterized with a ureteral catheter. After two weeks of rest in bed, the patient was prepared for operation.

September 17: Urethroplasty. On the second day, the catheter was removed and the urethra irrigated with boric acid solution. Another catheter was inserted. On the third post-operative day, the catheter was removed and the patient was catheterized every six hours. On the fourth day he was permitted to void. The wound healed by primary union.

On September 25, 1919, one year after the operation, sound No. 24 was passed without difficulty.

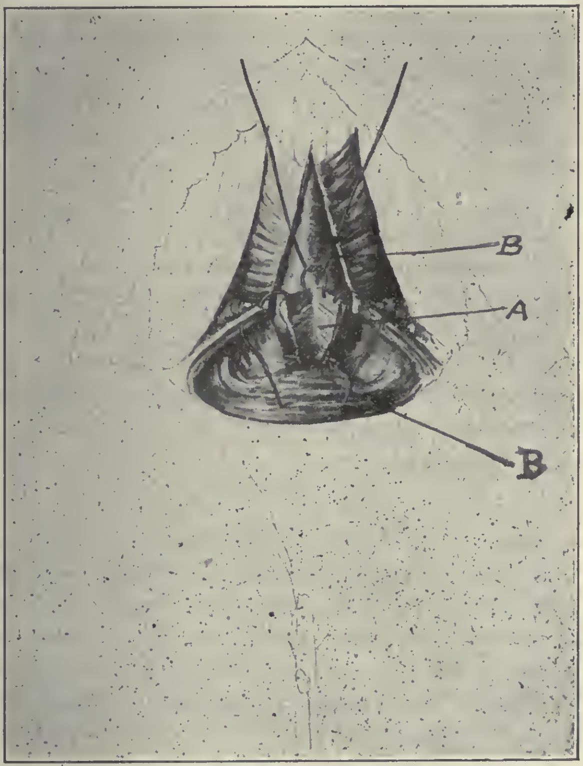

Fig. 14—A, corpus spongiosum replaced over urethral wound and sutured to superficial layer of triangular ligament; B, single suture so placed as to restore all muscle structures to their original positions over "butt-end" of corpus spongiosum.

January 8, 1920: Urethra admits 24 F. sound easily.

Four considerations essential to the success of the operation will be discussed briefly.

First: The Gross Pathology of Strictures and their Location. Strictures in the neighborhood of the bulb are those that give us the greatest concern. Those anterior to this point in the pendulous urethra need not concern us in this discussion. The so-called strictures at the bulbo-membranous junction are the ones which ordinarily cause acute retention of urine and its sequelæ. These regularly occur on the floor of the urethra, because of the force of the urinary stream being here expended upon the mucosa due to its upward angulation along the face of the symphysis. This is the most dependent portion of the fixed urethra. That the cicatrization and infiltration is not confined to the urethra is not generally taken into consideration in studies of this subject. Close observation, however, will demonstrate conclusively that pathologic changes also occur outside of the urethra in the spongy body and in the overlying structures, following the course of Colles' fascia anteriorly—thus accounting for their extension forward rather than backward into the posterior or prostatic urethra. These facts are evidenced clearly in the operation, the infiltration and contraction of the overlying structures frequently being extreme. At times it has seemed as if the mere release of the corpus spongiosum alone would free the urethra sufficiently to secure its patency.

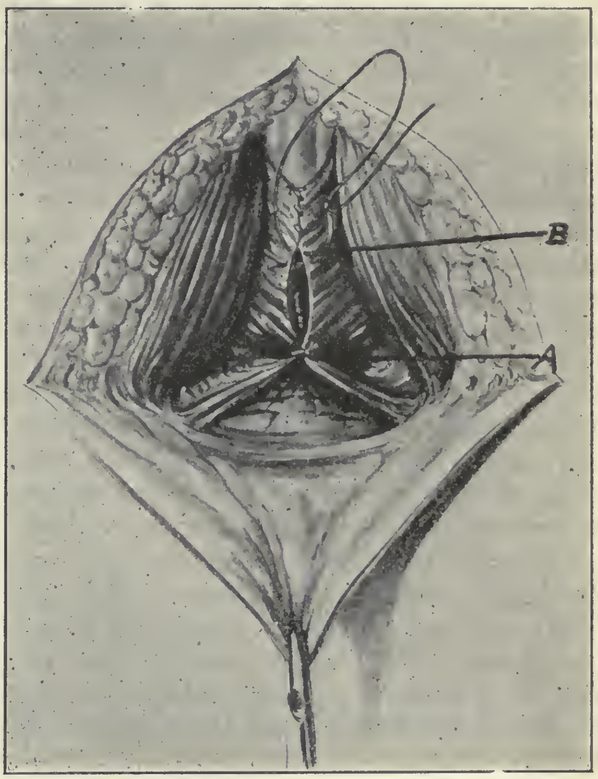

Fig. 15—A, suture tied; B, union of bulbo-cavernous muscles.

Second: The Selection of Cases for Operation. The clinical history usually determines between operative and palliative treatment. In general, uncomplicated cases which respond well to palliative measures or those in which it is easy to pass instruments without causing too much bleeding or pain are not considered for operation. Severe symptoms, such as acute retention of urine or disagreeable reaction to instrumentation, suggest operation.

Third: The Pre-operative Preparation. This is the most important consideration in determining the outcome of the operation. Since primary union is a requisite for its success, the tissues traversed must be as nearly normal as possible. In many instances there is an inflammatory condition located in the urethra and in the superimposed perineal tissues, even when there is no pronounced urinary extravasation or abscess formation. Many of the patients are also in such poor general condition that preparation similar to that for prostatectomy is logical; and it resolves itself, much as do those cases, to either a one-stage operation with preparation per urethram or a two-stage operation, including a preliminary cystotomy. This latter procedure I am much in favor of, especially in cases complicated by perineal invasion, since it gives all the time desired for the rehabilitation of the patient and the improvement of local conditions. With the aid of suprapubic drainage the patient obtains nights of beneficial sleep, with relief of vesical urgency and complete rest to the part concerned. During this time the urethra can be treated with irrigations or instillations, and perineal difficulties can also be overcome by suitable treatment. Should infiltration and abscesses be present, they can be drained. It is of primary importance that the perineal tissues be in good condition, and I usually delay the matter of operation until I am convinced that primary union can be confidently expected.

Fourth: Post-operative Treatment. Here failure may attend the operation unless great care is exercised in the treatment of the wound. In a moist-bacteria-laden area frequent changes of dressing must be made and perspiration prevented, if possible, by avoiding the use of heavy bedclothing. Immediately after the operation, it is my practice to cover the field with an unguent composed of paraffin, wax and petroleum, which acts not only as an occlusive covering but also as an antiseptic, in that it envelopes any organisms present in the skin and renders them inert.

At the time of operation, an indwelling catheter is fixed to the glans penis and allowed to remain *in situ* for forty-eight hours. As it is desirable for the parts to be at perfect rest, any irritability must be counteracted by sedatives, and in these cases I am accustomed to administer small doses of codeine during the first few post-operative days. At the expiration of forty-eight hours the catheter is slowly withdrawn while a gentle stream of hot boric acid solution is allowed to flow through it. A fresh catheter is then inserted and allowed to remain for twenty-four hours. This concludes the third post-operative day. On the fourth post-operative day the patient is catheterized every four hours or when request is made. On the fifth day, voluntary micturition is permitted. A sound is passed on the tenth day, and one of larger caliber a week later. It is my experience that no further instrumentation is really necessary, for the patency of the urethra is assured.

Conclusions: That this procedure is a logical one, is based upon the following considerations.

1. The exposure is an anatomical one and complete, inflicting no irreparable trauma and yielding a practically bloodless field.
2. By this approach the strictured area itself and the tissues overlying it are made clearly visible and can be dealt with in a truly surgical manner. The exposure of the bladder end of the urethra, which is so often hard to find through the old incision when no guide is inserted, gives no difficulty whatever.
3. The urethral repair can be performed with exact knowledge as to the capacity of its lumen, and the contracture of the superimposed tissues can be prevented by restoring them without tension.
4. Healing by primary union insures against the recurrence of obstructing infiltrate which characterizes external urethrotomy.

219 West 81st Street.

Ureteral Stricture.

Ureteral stricture is the cause of more kidney pathology (excluding conditions usually classified as medical) than any one factor. It accounts for the majority of hydronephrosis cases, and thus indirectly for many cases of floating or movable kidney, and of pyonephrosis. The majority of pyelitis cases have ureteral stricture and obstruction as a basis. Most cases of pyelitis of pregnancy and of the puerperium depend on stricture, as do many cases of pyelitis in children. Some cases of albuminuria and eclampsia leading to premature childbirth are due to stricture. Most cases of stone in the ureter and probably many cases of stone found in the kidney and bladder arise in an area of ureteral stricture. It is probable that urinary stasis due to stricture is the predisposing factor in many cases of stone arising in the kidney, and of recurring kidney stone after operation. Many, if not the majority, of the cases of so-called essential or ideopathic hematuria are due to urethral stricture. —Guy L. Hunner in the *N. Y. State Journal of Medicine.*

In most cases of prostatic obstruction a silver or block tin catheter can be passed, with gentleness, even when Mercier and bi-coudé catheters fail.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

New York, November, 1920.

DRAINAGE IN CHOLECYSTECTOMY.

After cholecystectomy with ligation of the cystic duct, complete healing is ordinarily so prompt that one often feels tempted to close the abdominal wound without providing any drain, because in a very large percentage of cases a drain proves to have been unnecessary. Some surgeons have yielded to this temptation and after a series of satisfactory results, have even proposed non-drainage as a routine. John T. Bottomley of Boston is a recent advocate of this procedure. In the *Boston Medical and Surgical Journal,* August 19, 1920, he reports a series of twenty cholecystectomies, (for both acute and chronic cholecystitis), in fifteen of which he employed no drain and in the remaining five of which (because of oozing not controlled during the operation, or of soiling from an infected gall-bladder) he used only a small drain for 24 to 36 hours. In none of these cases was there any leakage of bile and, upon that experience, Bottomley proposes—somewhat timidly, to be sure—the discontinuance of drainage after cholecystectomy. He says:

> For the past decade or two the tendency has been to limit or to do away entirely with the use of drainage in abdominal cases. We may cite as witnesses the facts that not a few surgeons now use no drainage after reasonably early operation for perforation of a gastric or duodenal ulcer, that many men no longer use drainage as a means of carrying off the serous effusion accompanying acute appendicitis and that many pelvic cases now go undrained which would certainly have been drained some years ago. Most of us older men can remember the days when abdominal drainage meant huge wads of gauze packing sticking out of the abdominal wounds and making necessary great suffering and often serious shock in their removal. To-day a split rubber tube carrying gauze, or a cigarette drain suffices in most instances.

This is quite true. Surgeons have learned that within the abdominal cavity a drain accomplishes nothing unless there is a collection of fluid to be drained, that the gauze or tube quickly becomes walled off and so can evacuate secretions only from the tract in which it lies or from the pocket or cavity, if any, into which it leads. *But there are conditions—and cholecystectomy is one of them—in which caution dictates the provision of a drain, not for the escape of any fluid then present or forming, but as a safety-valve for the possible escape of fluid later on.*

Bottomley says: "I realize that twenty cases are far too small a number from which to draw a general conclusion." [We quite agree with him in this.] "I am working with an open mind and am just as willing to discontinue this practice, if I find I am subjecting patients to undue risk, as I am to continue it, if things go well. *If the disuse of drainage is safe in most of the cases of cholecystectomy, certainly drainage should be done away with.*" [Italics ours.]

We cannot follow the author in the deduction that because "disuse of drainage is safe in *most* of the cases of cholecystectomy," it should be done away with. Quite the contrary! Because disuse of drainage is *unsafe* in *some* cases, it should be provided, as a precaution, in all.

We believe it to be an observation in the experience of most surgeons that in some cases of cholecystectomy and cystic duct ligation (with chromicized catgut), however carefully and neatly performed, there occurs, sometimes within a day or two, sometimes in a week to ten days, a more or less profuse escape of bile. We do not know of any way of determining in advance whether this will happen, nor any way of preventing it, and so we believe it wise and proper in all cases of cholecystectomy to leave a small tube in the wound leading down to the stump of the duct. A small rubber tube, inserted thus as a precautionary outlet and removed on about the seventh day will not prolong the convalescence nor, materially, the complete healing. Nor does a drain, if thus used, threaten infection of the abdominal wound, as Bottomley suggests of larger drains.

Between the large gauze packing, which is unnecessary, and no drain at all, which is unsafe, there is the rational medium of a simple tube outlet which seems to us to be both wise and, in most cases, sufficient. If the gall-bladder is dissected out of its peritoneal envelope, at least from its capsular attachment to the liver, and especially if the cystic vessels have first been tied, there is no oozing from the liver bed to require gauze tamponade. A *small,* soft rubber tube is inserted down to the stump of the cysticus and, to prevent its displacement during the suturing of the abdominal wall, we have found it useful to anchor it with a fine catgut stitch passed through the end of the tube and through the stump of the duct distad to the chromic catgut ligature. As an extra precaution, it is often wise to provide for drainage of any blood or infected fluid from the depth by introducing another rubber tube, also small but larger than the first, into Morrison's space. Only when there is oozing, or the prospect of oozing, from the liver bed of the gall-bladder or from a laceration of the liver, is it necessary to employ gauze; and, then, this can be done by splitting the second tube in its length to partially enclose a gauze wick. Both tubes, lying together, make but a small breach in the belly wall which closes soon after their removal. Moreover the second tube can usually be safely removed in 48 hours.

ANESTHESIA IN SURGICAL TUBERCULOSIS.

The risks of an inhalation anesthesia, especially etherization, to a patient affected with pulmonary tuberculosis are quite recognized and, when possible, avoided by surgeons. Nor are they unfamiliar with instances of the lighting up of unsuspected pulmonary disease by etherization in individuals operated upon for tuberculous lesions or, indeed, for other conditions. Probably, however, surgeons have not sufficiently appreciated this danger. It is interesting, therefore, to note the warning uttered by Ethan Gray, of Chicago, in *The American Review of Tuberculosis,* September, 1920.

He records as his experience that "not infrequently active pulmonary tuberculosis is seen in patients who give a history of having recently had an operation, which, in most cases, was done for the relief of conditions which, in themselves, would suggest tuberculosis elsewhere in the body, namely, cervical glands, cold abscesses, tuberculous joints, ischiorectal abscess and fistula, orchitic tuberculosis, tuberculosis of the prostate or kidney, etc. Further, it has been noted that the history of these cases often contains no mention of pulmonary tuberculosis prior to the operation. But, following operation, for the first time, comes the story of persistent elevation of temperature and increasing cough. * * * The class of cases here discussed gives a history of ether anesthesia, few or none of chloroform administration and absolutely none of local anesthesia."

The practice is, of course, general to examine heart, lungs and urine before administering an anesthetic. What Gray's observation suggests to us is that it is important, in all cases of surgical tuberculosis, that there should be a very careful examination of the lungs by physical signs and roentgenographically, to determine the presence or absence of pulmonary tuberculosis, healed, quiescent or active; and that ether should be avoided in those cases, especially, in which the lungs are not free from suspicion.

Announcements

UROLOGICAL NUMBER.

The December issue of the Journal will be devoted to urology and will contain the following articles: *Further Progress in the Treatment of Tumors of the Female Bladder,* by William Neill, jr., Baltimore; *Urethral Abscess,* by Victor C. Pedersen, New York; *Urinary Extravasation,* by Clarence Martin, St. Louis; *Notes on the Differential Diagnosis of Various Types of Renal Hematuria,* by A. Hyman, New York; *Chronic Urethritis,* by Irvin S. Koll, Chicago; *Urethral Strictures,* by A. Ravogli, Cincinnati; *Further Observations on Tuberculosis of the Male Genital Tract,* by J. D. Barney, Boston; *Cystoscopy in the Female,* by H. D. Furniss, New York; *Radium Treatment of Bladder and Prostatic Cancer,* by Gustav Kolischer, Chicago; *Urethral Strictures,* by E. G. Ballenger, Atlanta; *Rebellious Suppurative Cystitis,* by A. V. Wendel, Newark, N. J.; *Removal Methods for Bladder Stones,* by Bransford Lewis, St. Louis; *A New Principle Applicable to Treatment of Gonococcal Urethritis,* by Frederic S. Mason, New York.

SUBMUCOUS RESECTION OF THE NASAL SEPTUM.

During the coming year the Journal will publish a series of articles on *Submucous Resection of the Nasal Septum* by W. Meddaugh Dunning of New York City. They will cover the physiology of the nose, the anatomy and pathology of septal deviations, the indications for resection and the technic of standard operations. These articles are freely illustrated and will, we believe, be found of much practical interest.

Surgical Suggestions

Multiple exostoses is sometimes an hereditary affection, descending through several generations, in which it may be limited to one sex.

It should not be forgotten that epithelioma sometimes occurs on a finger or toe, or in the web between the digits. It may have its origin in a keratosis. Unless radium treatment produces progressive healing amputate the digit early. Examine the lymph glands for enlargement.

Fracture of the patella is not always associated with a palpable separation of the fragments. Subperiosteal or, more strictly, subaponeuotic, fracture of the patella occurs occasionally. Such an injury is suggested by localized tenderness, by ecchymosis and by swelling in the quadriceps region.

It is altogether sloppy to smear the patient's perineum and buttocks with lubricant when making a digital examination of the rectum. What lubricant may remain externally after withdrawing the finger should be wiped off before the patient leaves the table—lest his next visit be to a physician more neat and considerate.

In the treatment of Colles' fracture do not include the fingers in the splinting and do not immobilize the wrist for four or more weeks. It is important to keep the fingers actively mobile from the outset and to begin movements of the wrist early. Once reduced, the fragments in a Colles' fracture are not apt to become displaced. Prolonged splinting does harm rather than good.

Complete intestinal obstruction—as by a rectal carcinoma—is an urgent condition that justifies the surgeon in performing whatever operation he finds necessary, even if it be the infliction of a permanent colostomy. But a patient—whether or not he be a charity case in the hospital ward—who has an inoperable cancer of the bowel that is not causing complete obstruction should not be submitted to a deliberate colostomy without his approval. He need not be told that he has a cancer but he should be told that the operation will make an intestinal outlet that will discharge feces upon his abdomen as long as he lives.

Progress in Surgery

Selections from Recent Literature.
Edward Bleier, M.D., Abstract Editor.

Mobilization in Injured, Infected and Fractured Joints.

Clarence McWilliams, New York. *Medical Record*, September 4, 1920.

The most valuable acquisition that the surgery of the war has given us is the Willems method of treating joint lesions, whether aseptic or infected, by immediate, active, and continuous mobilizations. To accept this method in civil practice, as it must be, will mean the complete revolution of the old, firmly established dogma of the necessity of immobilization in all joint injuries. This change can be effected only by the demonstrated superiority of this method over others in the successful treatment of the vast number of severe injuries of joints which occurred during the war. Willems gives the figures in regard to the final outcome of his treatment in 100 consecutive knee cases, eighteen of which were accompanied by a purulent synovitis of a virulent type ,chiefly streptococcic. Among these 100 patients there were no deaths and no amputations. There was one resection, and there were two stiff joints. These are very striking and remarkable figures. In comparison, the results obtained in one evacuation hospital of the American Expeditionary Forces suffer markedly, due to the too early evacuation of patients, which necessarily resulted in immobilization, and the half-hearted attempts at mobilization. Of eighty-two patients with knee injuries, sixteen became infected, nine died, three had amputations, seven suffered complete ankylosis, while in one case resection was performed.

McWilliams divides the subject into the mobilizing treatment (1) of the acute cases (*a*) aseptic, (*b*) infected, and (2) of the chronic cases.

The Acute Diseases.—In general the Willems treatment is the same, except for the preliminary procedures, whether a joint lesion is infected or aseptic. In the case of recent injury, one should excise the contused and infected soft parts, extract foreign substances, remove the rough and dirty edges of the bony wounds, extract detached bone fragments, wash out the cavity, and completely close the synovial membrane. In an infected joint one must perform an arthrotomy by appropriate incisions and leave the wounds open without any tubes or drains into the joint, and no splints are to be applied. Following these preliminary procedures, the technique in the two types of acute cases is the same. To obtain results one must absolutely follow the methods which Willems has so carefully and successfully worked out in a large number of cases. The author describes in detail the procedure of mobilization required in these cases.

After the removal of semilunar cartilages, or joint mice, the active motions should be instituted at once, immediately after the effects of the anesthetic have worn off. There need be no fear of any deleterious influence on the incision if this is properly repaired after removal of the cartilage. A continuous catgut suture closes the synovial incision edges and the overlying tissues are brought together by interrupted silkworm gut sutures, which should not be removed for twelve days. McWilliams used this technic in half a dozen patients, instituting the active motions at once without splinting. Half of these patients have had to be *aspirated*. One patient drained sterile fluid from the joint for a week through the incision which opened of itself. Careful sterile dressings prevented any infection of the joint and the active movements were gone through with as though the joint were not open. The good results were astonishing in all cases.' From a two to four months' disability, as would be the case under the old immobilization treatment, the time was reduced to a month at most, when full motions were obtained.

The joint incisions, after foreign bodies have been extracted, should be completely closed, after thorough lavage of the cavity with physiologic sodium chlorid solution followed by pure ether. The edges of the bruised and infected wound of entrance should be first excised until healthy tissue is reached. No drainage of the joint should ever be used in operations for the extraction of foreign bodies performed immediately following the injury. Drainage simply invites infection. A closed joint will take care of infection much better than we had any idea of. The Willems' mobilizations as just outlined should be exercised immediately. Aspiration of hydrops into the joint will probably be required, possibly a number of times. Rising temperature and local inflammation will presage the onset of infection. Streptococcic infection will require immediate opening of the wound, but no drains should be inserted. Willems' mobilization from the start, and walking should be carefuly carried out. After a few days, if the temperature does not subside, and there is great and continuous pain, the drainage is not sufficient and the original wound should be enlarged. If the infection is produced by less virulent organisms than streptococci, the joint may be aspirated by means of a trocar and cannula, every other day, and washed out. A fall in the temperature will indicate subsidence of the infection while its increase will require opening of the wound and drainage without tubes. The best drainage is accomplished through adequate incisions by means of active, faithful mobilizations combined with walking without crutches.

Septic joints arise as complications of pneumonia and various other acute infections, as well as trauma. Streptococcus infections also occur as a result of acute traumatisms, direct or indirect. Direct contusion is a frequent cause, while severe twisting of the knee is an indirect cause. Cases occur in which there is no ascertainable trauma nor any demonstrable general infection.

Fractures of the olecranon and patella have been treated usually by prolonged immobilization. This has produced a long disability caused by subsequent stiffness in the joints. Willems has overcome this by his early mobilizations. He encircles the fragments by a buried suture of silk or silkworm gut and brings the edges of the tears in the lateral tissues together by sutures. No splints are applied subsequently. Active, gentle motions are soon begun, but walking, in the case of a fractured patella, is delayed for ten days.

Tuberculosis of the Knee Joint in Children. M. S. Henderson, Rochester, Minn. *Minnesota Medicine,* October, 1920.

Henderson outlines in a general way the diagnosis, etiology, pathology, and treatment of this condition. The major part of the discussion is devoted to the question of etiology, the author assuming the attitude that tuberculosis of the knee is always secondary to infection elsewhere, and often preceded by trauma. His conclusions are as follows:

1. Tuberculosis of the knee is always secondary to a focus elsewhere in the body and may be caused either by the human or bovine tuberculosis bacillus.
2. Trauma is a prominent etiologic factor.
3. The disease may be either primary in the synovia or in the bone. It is difficult to determine which is the more common. It is the impression of the author from clinical experience that the synovial type is fully as common in children as the osteal type.
4. The symptoms are usually mild and the deformity develops surreptitiously with but little complaint from the child.
5. The treatment is essentially conservative, and if instituted early, carefully planned, and carried to completion affords a good prognosis.

The Indications for Active Immediate Mobilization in the Treatment of Joint Injuries. Ch. Willems, Belgium. *Annals of Surgery,* October, 1920.

Willems in this article adds no new details to his already well known principles in the treatment of joint injuries. He calls attention, however, to the causes of failures in the hands of other observers. Failures are due to either incorrect or more often incomplete carrying out of the treatment.

In purulent arthritis, pus retention is usually due to insufficient mobilization. This may be remedied by enlarging the incisions or making the movements more complete. The slightest amount of pocketing is sufficient to arrest motion. It may often be necessary to have a special nurse, familiar with the method, to constantly encourage the patient in the obligation of movement.

In cases of joint injuries associated with fractures, Willems believes that his method is serviceable, no matter how extensive the lesion. Of course in many such cases, the movements must be more limited than in cases not associated with fracture. If there is infection of the articular wound in addition, mobilization is imperative to secure adequate drainage. Where there is a fractured knee, mobilization may be secured in bed, especially if the traction employed is sufficient to secure a fairly good fixation of the fragments.

Even in cases where a good part of the epiphysis is destroyed, as for example part of the condyle of the femur, mobilization yields the best results. It may be necessary to use a jointed brace for support.

Lastly, where there is considerable destruction of the soft parts, especially the ligaments, the method is most useful.

The Abduction Method Considered as the Standard Routine in the Treatment of Fracture of the Neck of the Femur. Royal Whitman, New York. *Journal of Orthopedic Surgery,* October, 1920.

Whitman presents the details of the abduction treatment for fracture of the neck of the femur. He considers this the only proper method of treatment from the mechanical standpoint, and claims that this view is borne out by the excellent results obtained.

The patient having been anesthetized is placed on a pelvic support with a perineal bar, the shoulders resting on a box of equal height. Two assistants make manual traction on the extended limbs, drawing the perineum firmly against the bar and reducing the shortening on the injured side, as demonstrated by measurement; the surgeon meanwhile lifting the thigh upward if it is below the plane of its fellow. The limb is then rotated slightly inward, thus completely apposing the fragments. Both limbs, extended and under manual traction, are then abducted to the full limit, on the sound side first, to demonstrate the normal range and to balance the pelvis. When this limit is approached on the injured side, the tension on the capsule aligns the fragments in a horizontal plane, and as the inner, or head fragment, is fixed by the acetabulum, finally forces the neck fragment against it. This mutual pressure is the first essential of stability, and it is further assured (in central fractures) by the inclusion of the line of fracture beneath the acetabular rim, by the apposition of the trochanter and the side of the pelvis, and finally by the absolute muscular impotence incidental to complete abduction. A long plaster spica is then applied which by fixing the limb in complete abduction, full extension, and slight inward rotation, insures the continued effectiveness of the anatomical splinting. If the fracture is incomplete or impacted, the neck in its relation to the shaft is usually displaced backward and downward, and whenever the deformity is sufficient to seriously impair the normal range of motion, it should be corrected.

Forward Dislocation of the Astragalus, and with it the Foot. Robert Henry Fales Dinegar, New York. *Annals of Surgery,* October, 1920.

The writer reports a case of this very rare lesion. Of the five types of this lesion, namely forward, inward, upward, backward, and outward dislocations, only about 100 cases have been reported. The forward dislocation of the astragalus is the rarest form of all. The author describes the violence producing the lesion in this case, which occurred in a young laborer. In the X-ray pictures of the foot before reduction, the following points were noted: The astragalus was dislocated forward. The posterior portion of the oscalcis was further forward and nearer the malleoli than normal. The foot was more plantar-flexed than normal. The hollow of the instep was increased. The tip of the external malleolus was fractured but not displaced. The tip of the internal malleolus was fractured and displaced forward. The relation of the astragalus to the os calcis and vavicular bone was normal. The tarsus was slightly inverted. The astragalus in an anterior view showed, in addition, some slight outward displacement. Reduction was easily accomplished and the foot placed in a cast. The final result was excellent from a functional standpoint.

Clinical Considerations of Osteomyelitis.

A. J. Ochsner and D. W. Crile, Chicago. *Surgery, Gynecology and Obstetrics,* September, 1920.

The authors present a very elaborate discussion of the scientific aspects of this subject. Special attention is given to the anatomy, pathology, diagnosis, and factors in regeneration. The practical points in reference to diagnosis and treatment are the following:

1. An early concise diagnosis and immediate surgical treatment is of the greatest importance.
2. The operation should invariably consist in splitting the periosteum for a distance of 2 to 5 cm. beyond the area of pain upon pressure in the bone in each direction.
3. The periosteum should be loosened from the bone 1 to 2 cm. on each side of the incision.
4. In extremely severe cases this should be the extent of the primary operation.
5. In less severe cases ultimate healing can be hastened by carefully opening the medullary canal at the point previously located because of pain on pressure.
6. Care should be taken to prevent traumatizing the tissues by rough chiselling.
7. Moist hot antiseptic dressings with fixation of the extremity and with the use of the electric light treatment increase the comfort and facilitates healing.
8. The shaft of a long bone should never be removed until a good involucrum is formed.
9. In late cases or in secondary operations, every particle of dead bone and tissue must be removed.
10. At this operation some definite plan must be carried out to facilitate closing the defect.
11. Skin grafting is of great value in many cases.
12. Local foci of infection such as abscesses of tonsils, teeth or sinuses, should invariably be eliminated at once upon undertaking the treatment of patients suffering from osteomyelitis.

The Role of Cancellous Tissue in Healing Bone.

T. Wingate Todd, Cleveland. *Annals of Surgery,* October 1920.

From a careful clinical and experimental study of the subject, Todd lays down the following principles:

Cancellous tissue is one of the chief agents in regeneration of bone, and like the cambium layer of the periosteum, should be treated at operation in the most conservative manner, consistent with thorough exploration and drainage. In regeneration the cancellous tissue nearest the midlength of the bone grows most rapidly, whereas that in or near the articular extremities shows less readiness to proliferate and fill the cavity. Septic bone cavities should be permitted to heal from the bottom, the wound in the soft tissues being kept widely open until this has occurred. The least possible mechanical disturbance of the cancellous tissue should be employed and no disinfection of the cavity attempted, for this simply kills the remaining tissue from which regeneration is expected. Regenerating bone is very sensitive to and easily affected by pressure, even of the soft tissues, and by inefficient drainage. It is not adversely affected by the ambulatory method of treatment. Compact bone plays a very minor part in regeneration.

The Barrel-Stave Splint in Fracture of the Clavicle.

H. A. Royster, Raleigh, N. C. *Southern Medical Journal,* September, 1920.

Royster claims that the factor which produces the deformity in fracture of the clavicle is not, as was previously supposed, the pull of the attached muscles, but the actual weight of the shoulder, which falls downward and backward. The essential feature of treatment should therefore be the replacement of the shoulder. The Velpeau and Sayre dressings are anatomically incorrect and productive of suffering. The Velpeau dressing unreduces the fracture after it has been reduced, while the Sayre dressing reduces the fracture but also the patient.

The barrel-stave splint is here described again by its author:

"This is simply a barrel stave which has been cut at the ends and the middle fitted on the chest. The middle of the concave to fit within the heads of the humeri; a curve is put over the middle of the suprasternal notch and it is sawed at each end; a nail is driven into each end, but not through the splint. There is sufficient concavity here to fit the ordinary chest. The splint is padded and wrapped. I simply tie this corner of the bandage in on the nail; then carry it around to the other side and wrap it around that nail and come around to this side and wrap it again. The nails might be a little longer in this particular case. This is all we do. I am through now except for the turns to make the splint a little more firm. now, in case it tends to slip we can use some adhesive to reinforce it, especially in children. Union occurs in the ordinary case after about three weeks and the stave can be removed. We get good union and there is usually no lump or knot, which is present in most of the cases treated by other methods even where a so-called good result is obtained. I am sure if you use it you will be more than satisfied and you will get good results. All sorts of modifications may be made. One method consists in placing the stave behind; another is the T-splint, which was used on the other side during the war. The principle remains the same, that with this form of dressing, front or back, you can do without all the older forms of treatment and get perfectly good results.

Ankylosis of the Jaw.

Harry P. Ritchie, St. Paul. *The Journal-Lancet,* September 1, 1920.

Ritchie reports two cases of ankylosis of the jaw successfully operated upon, and presents a comprehensive view of the subject.

1. *The frequency* of the condition is not great, although more than is apparent because many cases do not find their way into the literature.

2. *The occurrence* is possible at any time of life, but more usually its inception, at least, is in the early years of life in and around puberty.

3. *Fixation* of the jaw in occlusion follows involvement of the temporomaxillary joint or the contracture of the fascia about the joint, particularly of the muscles, masseter, temporal, or pterygoids; therefore this may be readily considered as *articular* and *extra-articular.*

4. *Infection* and *traumatism* divide the primary cause, Blair saying equally, while Henderson and New prove that infection has a large percentage over traumatism.

Traumatism as a cause is, of course, covered by blows and kicks on the chin.

Infection may find its way to the joint by—

a. Inflammatory involvement of contiguous structures, namely, middle ear, parotids, tonsils, dental abscesses.

b. Metastatic involvement, as any other joint in the body may be affected.

c. The exanthemata.

5. *Unilateral involvement* seems to be most frequent, but sufficient percentage of cases show bilateral fixation to bring this consideration into every case. Under circumstances of late involvement the location may be very difficult; in fact, there are several cases reported by very eminent surgeons who have frankly confessed to having operated on the wrong joint, so that he is a wise surgeon who prepares his patient for an attack on both joints at the same sitting or as a follow-up operation.

When the joint is affected during the formative period of life and sufficient time has elapsed, a characteristic deformity is produced, which forms the basis for diagnosis in every case, although at times in later life the evidence may be practically negligible.

The surgical considerations are as follows:

1. The possibility of bilateral involvement plus the combination of articular and extra-articular cause.

2. The difficulty of anesthesia given with a jaw fixed in occlusion; therefore the patient must be brought to operation with an empty stomach on account of the possible aspiration of fluids. Many operators prepare for an emergency tracheotomy.

3. Experience has shown that, in inflammation covering a period of years, and especially in older patients, the bone becomes eburnated to an extraordinary degree of density, making the attack upon what seems to be a comparatively superficial joint a most difficult undertaking; therefore it is well to prepare one's self with several groups of instruments—chisels, saws, and burrs—because, it is our experience, this operation is not to be lightly undertaken and may develop into a distinctly major procedure.

4. By reason of the shallow shape of the joint and the rather delicate structure of the zygoma, there is no chance to obtain a movable joint or normally to reconstruct it, and the aim and purpose is to create a false joint either by removal of the head or section of the neck of the ramus.

5. The anatomical points to be considered are the following:

a. *The external temporal artery.*

This being a superficial structure it can be easily controlled if necessary; ordinarily it can be aovided, but no penalty results if it be destroyed.

b. *The seventh nerve.*

This is of the greatest importance, and the skin incision and the avenue of attack are most definitely influenced by the necessity of its avoidance.

c. *The internal maxillary artery.*

As this artery lies deep on the inner side of the ramus, it cannot be injured without severe complications.

The operation in both cases consisted of resection of the ramus of the jaw, and interposition of a flap of temporal fascia into the newly formed joint. In the first case the flap sloughed out, due to faulty technique, but the practical results were equally excellent in both cases.

The Non-operative Determination of the Patency of the Fallopian Tubes by Means of Intra-uterine Insufflation with Oxygen and the Production of an Artificial Pneumoperitoneum. I. C. Rubin, New York. *Journal of the American Medical Association,* September 4, 1920.

The importance of determining whether or not a woman's Fallopian tubes are both patent in establishing the cause and treatment of sterility is quite evident.

Rubin has found it possible to determine whether the tubes are patent or not by injecting oxygen into the uterus and in normal cases filling the peritoneal cavity with a measured quantity of oxygen. For the specific purpose of establishing the fact of open fallopian tubes the amount of oxygen need not exceed 300 c.c. The small volume of oxygen has the advantage of enabling the physician to examine the patient in the office without the necessity of her going to bed for twenty-four hours or more. The determination of the presence of the gas in the abdominal cavity is made with the fluoroscope. The technic is simple, the gas is soon absorbed, it produces little or no discomfort and no accidents have occurred from its employment.

The Cervical or Krönig Cesarean Section. Edward L. Cornell, Chicago. *Illinois Medical Journal,* September, 1920.

Cornell has performed 52 operations of this type with excellent results. The technique is described in detail. The essential feature is the extra-peritoneal exposure of the uterus. The incision is made in the mid-line, extending from the pubis to one or two cm. from the umbilicus. The peritoneum is opened, the loose peritoneum between the uterus and bladder is incised, and the bladder retracted downwards, thus exposing the lower uterine segment, or uncovered portion. A 12 cm. incision is made beginning from the lowest portion of the cervix, which is rarely more than one cm. in thickness, and the fetus is delivered head first by means of forceps. The uterus and incision are then closed. The main feature of the after-care is the emptying of the bladder, which should be performed every six hours.

The advantages of this operation may be briefly listed:

1. The test of labor can be given without fear.
2. There is less shock to the patient, as the intestines and peritoneum are not handled.
3. Less bleeding.
4. Less chance for formation of abdominal adhesions.
5. Better control of infection.
6. Less risk ot mother and baby.
7. Better after-results.
8. Less chance for subsequent uterine rupture.
9. It avoids craniotomy on the living child.

Infection, if present, is usually confined under the peritoneum. It can burrow upward only a short distance owing to the firm attachment of the peritoneum. It can burrow downward between the bladder and cervix, through the cervix, or beside the bladder toward the pubic.

If not treated, the abscess will point in the skin near the abdominal wound, or into the cervical canal. The treatment is easy. It can be reached extra-peritoneally through the abdomen, through the cervix, or by dissecting the bladder from the cervix through an anterior colpotomy.

Upon examining the uterus 6 to 10 weeks after operation, it is surprising how little scar tissue is left, and in consequence how little damage has been done to the uterus. Usually it is possible to feel a short (¾ inch) narrow scar in the cervix.

Rupture of Cesarean Section Scar in Subsequent Pregnancy or Labor. Eardley Holland, London. *The Lancet,* September 18, 1920.

Holland has made a very earnest study of this subject, in an endeavor to determine the etiology and anatomy of ruptured scars. Five cases are reported from the London Maternity Hospital. All phases of the operation were studied even down to suture materials used in the effort to definitely clear up the subject. The author's conclusions are:

(1) The frequency of rupture of the Cesarean section scar in subsequent pregnancy or labor (abortions excluded) is 4 per cent.

(2) The cause of ruptured scar is imperfect healing, leading to a thin scar in which muscular union has failed, and which consists of little more than peritoneum and decidua with a varying amount of intervening fibrous tissue.

(3) All thin scars stretch during pregnancy; rupture of a thin scar may be determined solely by the intra-uterine tension of normal pregnancy or by the uterine contractions of normal labor; or it may be favored by various accidental factors, of which the chief is insertion of the placenta over the scar, with partial separation of the placenta, and retroplacental hemorrhage.

(4) Other accidental factors are over-distension of the uterus, prolonged or obstructed labor, operative interference, such as internal version, the insertion of hydrostatic bags, and the administration of such drugs as pituitrin.

(5) In the reported cases rupture occurred almost as often during pregnancy as during labor (in proportion of three to four); and many cases have been reported as early as the seventh month of pregnancy.

(6) The chief cause of imperfect healing is infection of the uterine wound; other causes are imperfect methods of suture and the employment of unsuitable suture material.

(7) As regards the suture material, catgut should not be used, for the liability to rupture after catgut is two and a half times the liability after silk. For theoretical reasons silkworm gut is the most suitable material.

(8) As regards the incision, the scar of the transverse fundal incision is especially liable to rupture. Only one case has so far been reported of rupture of the scar of the cervical incision.

Puerperal Sepsis and Its Treatment. R. S. Titus, Boston. *Boston Medical and Surgical Journal,* September 23, 1920.

Titus reviews the present status of puerperal sepsis, laying special stress on the necessity for conservative treatment. He concludes:

Puerperal infection is bacterial infection. Organisms gain entrance, first by vaginal examination; second, by the presence of an abnormal vaginal flora at the time of labor: third, by extension from foci of infection elsewhere in the body. The three types of puerperal infection depending upon the organism are, first, hemolytic streptococcal infection; second, pyogenic infection; third, saprophytic infection. The treatment of each type depends upon the bacterial reaction and the knowledge of its pathology. By and large, leave it alone. The curette is dangerous. The antiseptic douche unintelligent. The conservative treatment rational and harmless. Surgery plays its part only when the infection has produced localized pus, and then the old-time surgical principle of the evacuation of pus obtains. Vaccines and serums have had their try and they have been found wanting. The future holds its hope first in aseptic preparation of the patient, absolute cleanliness of the operator. In this way, to lower the percentage of infection to its lowest possible point. Next, conservative treatment to do no harm rather than to go on the supposition that some good may come from interference and in the specific serum for each individual case based upon the success of the treatment of type four in pneumonia. Theoretically, vaginal smears and cultures of a pregnant woman taken soon before labor may point out those which contain harmful bacteria and, in consequence, some method of making these harmful bacteria harmless may be evolved."

The Surgical Treatment of Gastric Ulcer. Sir Berkeley G. A. Moynihan, Leeds. *British Medical Journal,* July 24, 1920.

Moynihan compares the various methods for the surgical treatment of gastric ulcer, concluding that partial gastrectomy gives the best results. This agrees with the opinion expressed in an article in this number of the American Journal of Surgery, by a French observer, Abadie.

The surgical treatment of a chronic gastric ulcer may call for the performance of one or other of the following operations:

I. Gastro-enterostomy.
II. Excision.
III. Gastro-enterostomy combined with excision by knife or by cautery (Balfour's operation).
IV. Gastro-enterostomy combined with jejunostomy.
V. Resection of a part of the body of the stomach—"sleeve resection."
VI. Partial gastrectomy.

Gastro-enterostomy alone has been abandoned by the author for the following reasons:

(*a*) The results, even when the operation was "successful," were not so satisfactory as those which now follow gastrectomy. The morbidity was greater, the return to health slower, the ability to take food early and generously was wanting, a more watchful after-care was necessary.

(*b*) Some cases returned with the ulcer still open, and a further operation was required. In such cases the ulcer had almost always perforated all the walls of the stomach, and adhesions had occurred to the liver, prancreas, or abdominal wall.

(*c*) Some few cases returned with carcinoma of the stomach after so long an interval as to make it probable that the cancerous change had occurred after the operation had been performed. Estimates of this sort are, to be sure, fallacious, for the chronicity of some forms of malignant disease of the stomach is remarkable. Moynihan was recently consulted, on account of a return of her symptoms, by a patient upon whom four years and seven months ago he performed gastro-enterostomy for carcinoma of the lesser curvature of the stomach, causing obstruction, when secondary deposits were present in many glands, in the falciform ligament (one of these nodules was removed for microscopical examination and confirmed the diagnosis), and the liver.

(*d*) There is evidence to show that gastric ulcer may develop, even after gastro-enterostomy has been performed, when the stomach itself was normal.

Excision of the ulcer, which promised great results, has been abandoned.

Eleven patients were submitted to a second operation, and seven of them showed active ulceration at the site of the excision, one had developed a fresh ulcer distal to the original one, and three had extensive adhesions which crippled the action of the stomach. The operation may fail on account of technical errors. Too small an area of induration surrounding the actual crater may be removed; the hard stiffened edges of the wound which remain, infiltrated by inflammatory products which have long been there, may not heal kindly or rapidly, and fresh ulceration may start before cicatrization is complete. In other cases a deformity of the stomach may be consequent upon the removal of an ulcer, especially of one which lay upon, or near, the lesser curvature; the normal peristaltic movements will then be checked at the line of scar, as a radiological examination will plainly declare. The use of unabsorbable sutures, especially continuous sutures, may lead to secondary ulceration. All continuous "seromuscular" sutures probably penetrate to the muscosa in more places than one; if this occurs, the suture will eventually ulcerate its way through to the lumen of the bowel and be discharged, or hang loose at the suture line for months or years. Finally, even with a careful technique, adhesions may form between the suture line and any viscus or the abdominal wall in contact with it, and some embarrassment of the action of the stomach will then certainly result.

Excision of the ulcer by cautery combined with gastro-enterostomy is probably the best operation short of gastrectomy. It destroys the ulcer more completely than does the method of excision, for the effect of the cautery extends widely beyond the seared edge of the wound. If by chance there is an early carcinomatous change it is probable that much of the risk of local recurrence is removed. No more tissue is sacrificed than is necessary, and the suture of the wound offers, as a rule, no difficulty.

Gastro-enterostomy combined with jejunostomy is a method reserved for cases of great difficulty. The results have been excellent. There are ulcers of the stomach so large, so awkwardly placed, and so deeply penetrating the liver, or the pancreas, in patients whose general condition is so poor that any operation becomes serious. Such cases may be unsuitable for Balfour's operation, by reason of the size or remoteness of the ulcer; and for the operation of gastrectomy by reason of the extremely feeble condition of the patient, who has perhaps recently suffered from a copious hemorrhage. In all such cases this type of operation is indicated.

Finally, partial gastrectomy is the operation of choice, where feasible. The risk is not great: over a period of ten years it is not more than 2.5 per cent. All things considered, and account being taken of the five years succeeding operation, it is probably a safer operation and is certainly more immediately satisfactory than gastro-enterostomy alone It cannot always be practised. The condition of the patient may forbid it. The ulcer may be so large and so placed as to make removal a matter of so great technical difficulty that the immediate hazards are unfair to the patient. But as experience grows the number of such cases diminishes. Nowadays Moynihan rarely practises any other operation than partial gastrectomy or gastro-enterostomy in "Y" combined with jejunostomy.

Gastric and Duodenal Ulcers: Typical and Atypical Forms; The Relative Value of Diagnostic Procedures. C. W. McClure and L. Reynolds, Boston. *Boston Medical and Surgical Journal,* September 9, 1920.

The authors present an analysis of eighty cases of peptic ulcer. In fifty-five of these the diagnosis was confirmed by operation; in the remaining cases the diagnosis was assured by *x-ray* and laboratory findings. The cases divide themselves naturally into the typical and atypical. Of the typical cases there were fifty-four. Summary of findings in these typical cases were as follows: The patient presents himself complaining of epigastric pain occurring at a fairly definite time after meals and in the great majority of cases relieved by taking soda or food, or less often by vomiting, which is frequently induced. Occasionally the pain radiates, usually to the back. Frequently night-pain is a disturbing feature. Although hematemesis and tarry stools occurred in nearly 20 per cent. of the cases, the occurrence of these phenomena in relation to the duration of the disease and the number of exacerbations is relatively infrequent. Rather rarely vomiting is a prominent symptom. Belching, regurgitation and other dyspeptic symptoms occur frequently but as a rule they are not particularly distressing to the patient.

The radiographic findings show evidences of an ulcer in some portion of the stomach or in the first portion of the duodenum.

The atypical class of peptic ulcer includes twenty-six of the eighty cases studied. This class may be divided into six types and contains the modification of the typical group produced by benign pyloric obstruction. The types are as follows:

The gall-bladder type of peptic ulcer. This class is characterized by pain resembling in all respects that occurring in cholelithiasis. The pain occurs either in periods of exacerbation, such as is the rule in the typical class of peptic ulcer, or at irregular intervals.

The pain in certain numbers of this group is located in the episgastrium and it may or may not radiate. There are six examples of this type of pain in this series. However, in certain of the cases the pain was not particularly severe; in one case it was dull, aching in character.

Type of peptic ulcer resembling malignancy. Three cases whose clinical picture resembled closely that of malignancy superimposed upon peptic ulcer have been studied. The three cases were operated upon and portions of the ulcers excised and examined microscopically; they showed no malignant changes.

Peptic ulcer with constant epigastric pain. Four cases of gastric ulcer, the diagnoses confirmed at operation, have come under observation in which the patients complained of constant epigastric pain. In one of these the pain was unaffected by food, while in the others food aggravated it. In one of the cases the x-ray findings were diagnostic; *i. e.,* an incisura and a niche present on two examinations made several weeks apart. In the other cases the radiographic findings were distinctive but not diagnostic.

The type of peptic ulcer with marked vomiting. Vomiting was a marked symptom in 4 cases. In 3 of these cases there was no abdominal pain; in one (gastric ulcer) there was mild epigastric distress followed by vomiting immediately after meals, in another (duodenal ulcer) there was slight epigastric distress accompanied by vomiting but not related to meals, while epigastric distress was rarely present in a third case (duodenal ulcer) and the vomiting was not related to food. In the fourth case vomiting followed severe epigastric pain; the pain was not related to meals. In the first three cases, in which the diseases had been present one to forty years, exacerbations had occurred, while the fourth case came under observation in the first attack. A history of hematemesis was obtained in each case.

The authors' conclusions are:

The symptomatology of peptic ulcer may be divided into typical and atypical groups. The typical type, by the aid of radiographic findings, may be diagnosed with a high degree of accuracy. In the diagnosis of the atypical class *x*-ray studies are of the utmost value; in many cases the diagnosis cannot be made without the aid of radiographic findings.

X-ray studies should form a part of the physical examination of every gastrointestinal case. Their importance in the diagnosis of peptic ulcer is second only to that of the history of the case.

X-ray studies are the most efficient and accurate aids in the differentiation between functional and organic pyloric obstruction, and between ulcer and cancer.

In the great majority of cases laboratory findings are of less value as an aid in the diagnosis of peptic ulcer than those obtained from radiographic studies.

The laboratory findings valuable in diagnosis are gross amount of blood in the vomitus or gastric contents, the frequent vomiting of old food residues, and tarry stools. Findings of less value are the persistent presence of occult blood in the stools, the presence of food residue in the gastric contents, and the presence of free HCl in the gastric contents.

Cancer; Factors Entering Into the Delay In Its Surgical Treatment. Channing C. Simmons and Ernest M. Daland, Boston. *Boston Medical and Surgical Journal,* September 2, 1920.

The authors present the statistics of 519 cases of carcinoma, admitted to the Massachusetts General Hospital, in order to ascertain the causes of delay in operation.

Their conclusions are as follows:

1. The symptoms of cancer are dependent on the organ attacked. There are few symptoms characteristic of the disease itself in its early stages.

2. The rapidity of the growth varies within wide limits in the organs attacked and what may be termed long duration in cancer in one situation is short in another.

3. The average duration of the disease in all cases on their admission to a hospital is 12.49 months. The duration may be divided into three periods—the length of time from the first appearance of symptoms to the first consultation with a physician, representing delay on the part of the patient. 2, The time from the first consultation with a physician until an operation is advised, representing delay on the part of the physician. 3, The time elapsed after the advice for operation is given until the patient enters the hospital, representing a second period of delay on the part of the patient.

4. The delay on the part of the patient after the onset of symptoms before seeking medical advice is 5.4 months. It varies considerably as to the situation of the tumor and the rapidity of its growth, but has little relation to the character of the first symptom.

5. The average delay on the part of the physician before advising operation is three months. The great majority of physicians in this community recognize the condition and advise operation promptly. The delay in carcinoma of certain regions is longer than is justifiable, however.

6. There is practically no delay on the part of the patient after operation is advised. The advice is accepted and arrangements made for operation at once.

7. In only 44.5 per cent. of the cases of cancer admitted to a general hospital is there any hope of cure by a radical operation. The operative mortality in these cases is 15 per cent., sepsis, shock, and pneumonia being the chief causes of death in the order named.

Treatment of Vascular Nevi with Radium. Douglas W. Montgomery and George D. Culver, San Francisco. *Boston Medical and Surgical Journal,* September 30, 1920.

The authors report very favorable results in four cases of large tuberous growths in infants. The influence of radium is most marked in the large tuberous, vascular, nevi. In these cases, the tumor growth is stopped, then the tumor shrinks in size, and finally the startling red color disappears. The technique is described in detail, with special reference to the necessity for regulating the amount of screening according to the nature of the case. The flat red nevus is not nearly so amenable to the treatment with radium as the large bulbous ones, but even these can be improved if carefully treated. The so-called spider nevus, consisting of a bright red point, with capillaries radiating out from it, is not at all amenable to radium treatment, as it contains no nevus or hyperplastic tissue to be acted on by the gamma rays. The electric needle should be used for these latter cases.

Radium in the Treatment of Malignant Tumors of the Nose and Throat. Robert Sonnenschein, Chicago. *Journal of the American Medical Association,* September 25, 1920.

In the opinion of Robert Sonnenschein, the future of radium therapy seems very bright, particularly in reference to applications in tumors of the nose and throat; but great caution is advisable in statements regarding actual cures. It is important to watch for recurrences during a period of from two to five years. In reporting cases, authors should give details of the preparation used, the method of application, duration of exposure, etc., in radium treatments. Following up the cases and reporting on them again whenever possible is of the utmost importance in the formulation of definite conclusions regarding the results of radium treatment. Radium is probably of great value before, and certainly after operations. It is very effective in relieving pain, hemorrhage, discharge, etc., in many inoperable cases. Sarcomas are especially responsive to radiation; the carcinomas yield much less readily, and the squamous type of epithelioma is scarcely amenable to radium at all. Complications, at least those reported, are not so frequent as one would be likely to expect. Burns were the most common ones, but even death may result from toxemia. Radium has many advantages as compared with roentgen rays, especially for application in the nose and throat. The diagnosis of the malignant cases should be made by a competent laryngologist, and the radium applied either by him or in cooperation with a radiologist. Only in this way will correct statistics and reliable results be obtained, with greatest benefit to the patient and the safest guidance to the profession.

Book Reviews

Lehrbuch der Chirurgie. Von Prof. Carl Garré, Direktor der Chirurg, Universitätsklinik in Bonn, and Prof. Dr. A. Borchard, Berlin-Litchterfelde. Octavo. 695 pages; 535 illustrations, some of which are colored. Leipzig. F. C. W. Vogel, 1920.

In order to bring the entire study of surgery within the compass of this reasonably small volume the authors have eliminated the discussion of the principles of surgery and of rare conditions. Moreover, only the classical operations, e. g. hernioplasty, amputations, etc., are described. The work is an eminently concise and practical text-book. The discussion is didactic, the arrangement is systematic and the text, it is a pleasure to note, is not overburdened with proper names. Apparently, the authors have had in mind the making of a practical text-book, and have succeeded admirably. The illustrations are numerous, almost entirely original and, as usual in continental publications, beautiful from a technical viewpoint.

Exophthalmic Goiter and Its Non-Surgical Treatment. By Israel Bram, M.D., instructor in Clinical Medicine, Jefferson Medical College, Philadelphia, Pa.; Physician on Visiting Staff of Philadelphia General Hospital; member of the Society for Study of Internal Secretions, etc. Octavo. 400 pages. St. Louis. C. V. Mosby Company, 1920.

The title of this book aroused the keenest anticipations on the part of the reviewer. In an editorial in the Journal, March, 1920, we quoted several passages from a then recent article on exophthalmic goiter by this same author, we suggested—as he does—the importance of the psychic factor in etiology, and we questioned whether the surgical treatment of Basedow's disease had fulfilled expectations. Both these themes, it is true, Dr. Bram expounds plentifully in his book but we regret to say, hardly to our satisfaction.

On page 96, he discusses the neurogenic origin of Basedow's disease. This important chapter is frankly disappointing. It consists largely of extensive quotations from other authors between which are sandwiched a few bare statements of the author's own views, with little direct evidence to support them. We do not intend to convey the impression that he is not correct in his views; indeed, we are willing to assert that he is. But we believe that he might have made this chapter far more convincing had he reported a study of his own cases, not only in regard to the frequency of predisposing and exciting psychic traumata but also in an analysis of the nature and varieties of psychic strains. We refer Dr. Bram to Sattler's exhaustive monograph on Basedow's disease to show how this phase of the problem can be attacked. The same criticism applies to the chapter in which he condemns the surgical treatment of exopthalmic goiter. Here again he calls into play much theoretical speculation and quotes *en masse* page upon page of views of other observers, but we fail to find any consistent and logical study of his own experiences or that of others. We frankly admit that the vast majority of surgical reports upon the results of operation for exophthalmic goiter are woefully lacking in accurate clinical study of so-called "cures" and we expected to find some study of this nature in Bram's book, but it is entirely lacking. It may be true, as Bram says, that "this condition (exophthalmic goiter) is no more a subject in the realm of surgery than is pneumonia or typhoid or scarlet fever." But he offers no proof that this is so, and it surely is no slight responsibility to condemn by a mere opinion the practice of thousands of able surgeons, among whom may be mentioned the Mayos, Kocher, Halsted and Crile for instance.

The remainder of the book, with the exception of the chapters on the non-surgical treatment, offers little in the way of novelty. A large part of the text consists of little more than extensive quotations from various writers. The author mixes the good and the bad indiscriminately, offering very little in the way of critique, so that it is hard to determine what he approves or does not approve. Many of the writers whom he quotes are not even representative. Moreover, we regret to see that many quotations in the text are not indexed in the appended bibliography. The chapter on the non-surgical treatment, especially psychotherapy, is refreshing. Here Bram speaks with the authority of experience. There is much shrewd and homely advice, and there is a human touch that is unfortunately largely lacking in current expositions of therapy. We wish that Bram had introduced the personal touch more frequently in his text.

Surgical Shock and the Shockless Operation through Anoci-Association. By George W. Crile, M.D., Professor of Surgery, Western Reserve University, Visiting Surgeon to the Lakeside Hospital, Cleveland, and William E. Lower, M.D., Associate Professor of Genito-Urinary Surgery, Western Reserve University; Associate Surgeon, Lakeside Hospital; Surgical Director, Mount Sinai Hospital, Cleveland. *Second Edition* of "Anoci-Association," edited by Amy S. Rowland, B.S. Octavo; 272 pages; 75 illustrations. Philadelphia and London. W. B. Saunders Co., 1920.

In the six years that have elapsed since the first edition of this book appeared Crile has seen no reason to abandon his kinetic theory of shock nor his surgical method, by "anociation" (anoci-association) of avoiding it. Indeed his continued experience in civilian practice and, especially, his work in the evacuation and base hospitals in the war where shock was so large a problem, have confirmed him in both his theories and in surgical anociation. This, indeed, is what led the authors to prepare a second, rewritten and enlarged edition.

They review the years of clinical and laboratory studies of shock (in which, it seems to us, the establishment of the operation of blood transfusion is the most brilliant chapter) and the various steps that led up to Crile's theory of shock and the practice and technic of anociation. The causes and phenomena of shock are described in exposition of the kinetic theory. Little here is added to the earlier presentation. The treatment of shock, occupying the next chapter, is brief but it contains all that is worth saying on the subject, to wit: physiologic rest, warmth, large quantities of fluids, elevation of the foot of the bed, large doses of morphin (*except when there is cyanosis*), blood transfusion and, when operating, nitrous oxid-oxygen narcosis combined with local anesthesia, and quick, deft operation by sharp dissection.

The rest of the book is devoted to the technics of anociation in operations generally and as applied to a large number of operations, individually: the avoidance of painful and distressing impressions before and after operation and the cutting off of noci-stimuli during operation by the combination of morphin-scopolamin, nitrous oxid-oxygen narcosis (never to the point of cyanosis and supplemented, if need be, with a little ether), infiltration of tissues with 1-400 novocain solution (in certain grave cases also with quinin-urea hydrochlorid to prevent after-pains), gentle manipulations and *sharp* dissection.

There are brief chapters on blood transfusion and on anesthesia.

Aside from any question of the theory upon which he bases anociation, Crile has been an inspiration to many by the demonstration of his technique of precision and gentleness—the wizardry of deft fingers.

Cerebro-spinal Fluid in Health and in Disease. By Abraham Levinson, B.S., M.D., Associate in Pediatrics, Northwestern University Medical School; Associate Pediatrician, Sarah Morris Children's Hospital of the Michael Reese Hospital, Chicago; Attending Pediatrician, Mount Sinai Hospital, Chicago; attending Physician, Children's Department Chicago-Winfield Tuberculosis Sanitarium. With a foreword by Ludvig Hektoen, M.D. Small octavo; 230 pages; 56 illustrations, including 5 color plates. St. Louis. C. V. Mosby Company, 1919.

The cerebro-spinal fluid has assumed so much importance in diagnostics and is the subject of so much study today, that this timely monograph, written clearly and without undue elaboration, should find a warm welcome. We have much enjoyed reading it. It presents the work of all other observers and, modestly, the observations of the author himself. After a brief "history of the cerebro-spinal fluid" Levinson recites the known facts and the theories concerning the anatomy, origin, absorption, and functions of the fluid. Following a chapter on the methods of obtaining the fluid for examination from the spine and from the head, are described all the various properties of the fluid in health and in disease—chemical, physicochemical, cytological; its bacteriology; and its various chemical and biochemical reactions, diagnostic and otherwise. In these chapters, in which the reactions are made easily understood to the reader, the author exercises a conservative critique and points out both the discrepancies of various observers and the undetermined factors yet to be resolved.

The technic of all the diagnostic tests, also clearly presented and compared, occupies a separate chapter. The final chapters are, respectively, on the peculiarities of the "cerebrospinal fluid in various diseases;" "intraspinal treatment" (including technics); and a "summary" in which the author very succinctly restates certain important known facts concerning the normal and the pathological fluid and suggests lines of research in which further studies are indicated.

Among the physico-chemical tests Levinson lays stress on the value of determining the hydrogen-ion concentration. For this he recommends the Levy-Rowntree-Marriott method.

The references in the work are very numerous, and the bibliography is gathered at the end of each chapter.

Although this monograph is a small one it covers the entire field admirably, and the author deserves commendation for its preparation.

Infectious Diseases. A Practical Textbook. By Claude Buchanan Ker, M.D., Ed., F.R.C.P., Ed., Medical Superintendent, City Hospital, Edinburgh, and Lecturer on Infectious Diseases to the University of Edinburgh; Major, R.A.M.C., T.F. *Second Edition.* Octavo; 609 pages; illustrated. London: Henry Frowde, Hodder & Stoughton, 1920.

The author has completed a revision of his work which had been delayed by reason of the war. This, therefore, results in a modernized volume well balanced in its discussion, with particular stress upon practical and useful phases. Discussions of bacteriology and pathology are intentionally minimized, in order to give a larger space to the more serviceable elements concerned in a discussion of infectious diseases.

The contents are based upon the diseases that are treated at the Edinburgh City Hospital, of which the author is the Medical Superintendent. It may be recommended for general usage to the general practitioner or, indeed, to the surgeon who, not infrequently, is sorely tried by questions involving differential diagnosis in the surgical wards.

Massage and Exercises Combined. A Permanent Physical Culture Course for Men, Women and Children. Health-giving, Vitalizing, Prophylactic, Beautifying. A New System of the Characteristic Essentials of Gymnastic and Indian Yogis Concentration Exercises Combined with Scientific Massage Movements. By Albrecht Jensen, Formerly in charge of Medical Massage Clinics at Polyclinic Hospital and other Hospitals, New York. Octavo; 93 pages; 86 illustrations. New York: Brooks and Porter, 1920.

For those who are seeking a manual that gives information concerning a combination of stroking and pressing movements with gymnastic exercises, this book supplies practical information. With wisdom, the author stresses the importance of the development of the nervous and circulatory systems rather than the mere development of muscular bulk. The book is well illustrated, and replete with suggestions, even if the physiology and pathology included are exceedingly amateurish, and often times weak and inaccurate.

Books Received

The Human Factor in Industry. By Lee K. Frankel, Ph.D., Third Vice-President, and Alexander Fleisher, Ph.D., Assistant Secretary, Metropolitan Life Insurance Company, with the co-operation of Laura S. Seymour. Duodecimo; 336 pages. New York: The MacMillan Company, 1920.

Chirurgie Réparatrice et Orthopédique. Publiê Sous La Direction de MM. E. Jeanbrau, P. Nové-Josserand, L. Ombrédanne et P. Desfosses. In two octavo volumes; 1,384 pages; 1,036 illustrations. Paris: Masson et Cie, 1920.

Diagnosis and Treatment of Brain Injuries, with and without a Fracture of the Skull. By William Sharpe, M.D., Professor of Neurologic Surgery, New York Polyclinic Medical School and Hospital, Consulting Neurologic Surgeon, Manhattan Eye and Ear Hospital, Hospital for Ruptured and Crippled, Beth Israel Hospital, New York City and Nassau Hospital, Mineola, Long Island, etc., etc. Octavo; 736 pages; 232 illustrations. Philadelphia and London: J. B. Lippincott Company, 1920.

American Medical Biographies. By Howard Kelly, M.D., Ll.D., F.A.C.S., Hon. F.R.C.S. (Edin) and Walter L. Burrage, A.M., M.D. Large octavo; 1320 pages. Baltimore: The Norman, Remington Co., 1920.

Eating to Live Long. By William Henry Porter, M.D. With an Introduction by Edwin F. Bowers, M.D. Duodecimo; 243 pages. Chicago: The Reilly & Lee Co., 1920.

The American Red Cross in the Great War. By Henry P. Davison, Chairman of the War Council of the American Red Cross. Duodecimo; 286 pages; illustrated. New York: The Macmillan Company, 1920.

The Fundamentals of Human Anatomy, Including Its Borderland Districts. By Marsh Pitzman, A.B., M.D., Professor of Anatomy in the Dental Department of Washington University, St. Louis. Octavo; 343 pages; 101 illustrations. St. Louis: C. V. Mosby Company, 1920.

Life. A Study of the Means of Restoring Vital Energy and Prolonging Life. By Dr. Serge Voronoff, Director of Experimental Surgery at the Laboratory of Physiology of the College de France. Translated by Evelyn Bostwick Voronoff, Assistant in the Laboratory of the College de France. Duodecimo; 128 pages; 39 illustrations. New York. E. P. Dutton & Company, 1920.

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THE KIDNEY PROBLEM IN GENERAL SURGERY.*

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Paris.

I want to speak about the kidney problem in general surgery and I shall explain some new ideas that first saw the light in this clinic and which should have a great influence upon operative results and indications.

We have long known that the fatalities in our clinic are kidney deaths, but the mechanical causes of this death have been known only for the last few years. Here, in this service, we have, more than others, the opportunities of studying the mechanism of the deaths from operation because all our patients have diseased kidneys and the majority of those who die after an operation, die from insufficiency of their kidneys.

As a matter of fact, the insufficiency of the kidney, that is to say, the principal cause of the death of our patients, consists in this: A great reduction in the quantity of urine in a patient whose maximum concentration is greatly reduced.

The reduction of the urine is noticeable after no matter what operation, major or minor. Now note the consequences. The patient, for instance, eliminated daily before the operation a thousand grammes of urine with a urea concentration of twenty grammes. The following day there is a reduction of five hundred grammes in the amount of the urine. In order to have the same elimination as before, the patient is compelled to increase the concentration of the urea in the urine to forty grammes.

Before: 1000 x 20 gr.=20 gr. urea
After: 500 x 40 gr.=20 gr. "

This is possible for the patient whose kidneys are good. The normal kidney is, indeed, able to increase the concentration of the urea to 55 grammes, which represents the maximum concentration, that is to say the highest concentration of which the kidney is capable in taking the urea from the blood. This idea of the maximum concentration, settled by Ambard and Papin in this clinic, has a great importance in the physyology and pathology of the kidney.

The formula of the maximum concentration (C. M.) measures the health of the kidney; if under physiological circumstances, the kidney is able to increase its power of concentration to 55 gr., it is not able, when it is affected, to increase its power to such a point. The decrease of C. M. is in proportion to the alteration of the kidney.

In the surgical patient whose kidneys are affected, the power of concentration has seriously decreased. This patient is unable to increase the concentration of the urea in his urine from 20 to 40 grm., if the C. M. is, for instance, represented by 20 grms. Five hundred grammes of urine with one maximum concentration of 20 grms. will give only 10 grms. of elimination every day.

After one operation, with the necessary modifications of the metabolism caused by the general anesthesia, it is not sufficient. When the elimination corresponds only to 10 grms., there is a retention corresponding to 10 grms: 10 grms. of retention in the organism gives 1 grm. of urea for every liter of lymph and of blood, so that the second day after the operation, we shall find 1 grm. of azotemy (retention of nitrogen) more than the amount shown before.

The third day, it will be the same, and the retention reaching the rate of more than 2 grms. the patient is exposed to a serious danger.

And it is easy to understand that the patient whose kidneys are affected before the operation will more quickly reach the point of azotemy, which will cause death.

In short, death after our operations, results frequently from a reduction of the quantity of urine in a patient whose kidneys are already affected.

Consequently it behooves us to know perfectly the working of the kidneys before the operation; in order to settle as exactly as possible the prognostics of our intervention.

But, what is the most accurate means of knowing the value of the kidneys?

The *analysis of the urine* has, now, no value; the amount of the urea in the urine depends upon the alimentation, upon the metabolism and, as we shall see, upon the blood urea contents. It does not signify anything, if we do not know the other important elements.

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*Address delivered at the Faculté de Médecine, Paris, to foreign students.

On the contrary, if we take into account only the concentration of the urea in the urine, we are unable to obtain any indications from the figures: for instance, 20 grammes are very good if this figure represents the average concentration of a patient who is able to increase his concentration to 55; this figure is, on the other hand, very bad if it represents the maximum concentration of a patient whose kidneys, being affected, are unable to increase the concentration above this figure.

The colored substances were considered for a long time as a good means of determining the working of the kidneys. Indeed, the means are very simple: after having injected under the skin a certain quantity of methylene blue or of the sulphonephthaléïne, we obtain a coloring of the urine, blue with the former and red with the latter substance; and, according to the speed of elimination and the intensity and duration of coloring, we conclude to a certain degree the value of the kidneys. This conclusion has no scientific value.

Indeed, all colored substances follow the law of elimination of the nitrogens; and, as I shall tell you soon, the rate of the elimination of the urea is settled by the blood urea contents, and for the colored substances it is the same: consequently, in order to infer from the coloring of the urine the value of the kidneys, it would be necessary to settle a ratio between the colored substances in the blood and in the urine at the same time. But, the colored substances are unstable; they easily change their composition so that it is preferable and easier to choose the urea in order to know the value of the elimination of the colored substances, than to study the elimination of the colored substances in order to know the urea function.

The determination of the blood urea content is under certain conditions an accurate means of appreciating the working of the kidneys.

Indeed when the "azotemy," that is to say the quantity of the nitrogen in the blood increases above 1 grm., it is certain that the kidney function is seriously affected. On the contrary, for the azotemy less than 1 grm. the same conclusion is not so exact. The increase of the urea in the blood results from several factors and not only from the alteration of the kidneys; so that it is not possible to infer from the azotemy with scientific precision the function of the kidney. It is necessary to have at the same time the ratio between the blood urea content and the rate of the urea in the urine.

The elimination of the urea depends upon two laws settled by Ambard: first, it is proportional to the square of the azotemy; second, it is inversely proportional to the square root of the urea concentration in the urine.

And if we determine at the same time the blood urea content (Az) the concentration referred to 25% (C) and the rate of the urea in the urine (D), we obtain the following formula of Ambard: (we also add the intervention of the weight referred to 70.)

$$K = \frac{\text{Az.}}{\sqrt{D \times \frac{70}{P} \times \frac{\sqrt{C}}{25}}} = 0{,}070^{*}$$

This figure represents the normal working of the kidneys.

In the pathological circumstances, this figure increases so that approximately a constant of 0,100 represents the half of the kidney function. With 0,140, we have only one-third of the function; with 0,210 the reduction increases almost to the ninetieth (90th) of the function.

Thus with the information of the constant, we may appreciate the value of the kidneys before an operation and define the prognostics of our intervention as regards the urea kidney function.

We must observe that the constant does not give more than the value of the urea function; as regards this observation I wish to point out: that the constant does not give the water function, and in order to know fully the function of the kidneys, we are obliged to study the water function, with special exploration which on the other hand has not the same value as the constant for the urea.

Actually, we have not any accurate means of knowing the quality of the kidney water function, and as the urea always depends upon the water we never obtain complete security about the function of the kidneys. However, after having disposed of this observation it is possible to define the employment of the constant in surgery, with two examples; first, for a nephrectomy and, second, for a prostatectomy.

The majority of our nephrectomies are based upon the indications given by the catheterization of the ureter.

But, in some cases, this catheterization of the ureter is impossible, e. g. the bladder is too sensitive to receive the necessary quantity of water, the ureter orifices can not be discovered, it is impossible for the catheter to enter sufficiently the ureter, etc.

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*Az=Azotemy; D=The rate of the urea in the urine in a given time; P=Weight.

What is to be done in such cases?

Formerly we tried to improve the state of the bladder; but it is always difficult on account of the bacilli which always come from the kidney into the bladder.

We have now with the constant a means of determining quickly the problem of the nephrectomy.

According to the clinic teaching, we consider the painful kidney as being the diseased one. We examine the patient and suppose the painful kidney is the affected organ. At other times we see by radiography a shadow in the region of the kidneys and we infer from that the alteration of the corresponding organ.

And having so settled the localization of the disease, we have no more than to define the kidney value of the opposite side; and here, the constant is to us absolutely necessary.

Two cases are to be considered.

1. The constant is below 0,100 and disease is unilateral. The nephrectomy of the altered kidney may be made with the fullest security.

2. The constant is above 0,100; this proves that the lesions are bilateral, that both kidneys are affected unequally, but the gravity of the disease is in proportion to the increase of the constant.

Nephrectomy is not forbidden, but it is necessary to pay great attention, above all, to the high figures of the constant.

Sometimes, students ask me: "At what figure do you operate, at what refuse operation?"

I can't answer; indeed it is a question of the increase of the constant and also of the interpretation of the alterations revealed by the constant.

As I previously said a constant of 0,140 corresponds to a reduction of 75% of the kidney function value. With this figure the nephrectomy exposes the patient to some dangers.

But it is also a question of a distribution of the lesions.

If the affected kidney is completely destroyed, so that it has no value, the nephrectomy may be made without notably changing the condition of the patient. The other kidney continues after, as before the operation, to assure the necessary elimination of the organism, and if the operation produces neither bleeding nor infection, nor intoxication by the anesthetic, the cure may be effected no matter what the figure of the constant may be.

On the other hand, if the most affected kidney still retains some functional value, the nephrectomy will impose upon the individual a corresponding reduction of the kidney function; and the other kidney will perhaps not be sufficient to permit a recovery.

It is always impossible to make this distribution of the lesions in advance.

But, in the course of the nephrectomy, if the surgeon has the kidney in his hands, he must appreciate the value of this kidney and conclude from its alteration as to the possibility, or impossibility of a nephrectomy. And I give to my assistants the following formula: "With the increase of the figures of the constant, the danger is greater as the alteration of the kidney to be extracted is less serious. The fullest security for the surgeon consists in finding a kidney quite destroyed."

Whatever the case may be, the constant in this matter constitutes for us a very great progress, permitting us to undertake a nephrectomy in some cases where it would otherwise be impossible to make, without the catheterization of the ureters, a prudent decision; and to push the indication of the nephrectomy to the most extreme limits.

The employment of the constant in *prostatics* is not governed by the same rules as in the cases of patients exposed to nephrectomy.

From this point of view, prostatectomy is not comparable with nephrectomy; the first does not take away anything of the kidney function; but the operation nevertheless may have a serious influence upon the working of the kidney, so that it is always necessary to study the value of the kidneys before the operation.

Three cases are to be considered according to the constant being above 0,200, below 0,100, between 0,100 and 0,200.

1. *When the constant is above* 0,200, it is preferable not to operate.

Without affirming that the operation will prove fatal, still there is always a great danger from the point of view of the kidneys.

We have been able to cure a patient having this reduction of kidney function, but another patient died very quickly after the operation from uremia.

Therefore, in our opinion, it is preferable not to operate.

2. *The constant is below* 0,100. The case is fairly favorable, the danger coming from the kidney is as small as possible; but we may not have complete security for some patients.

Those who, before operation, had a normal figure for the constant, may die through the kidneys, as sometimes there is *after the operation* a disturbance of the kidney function due to particular fragility of the kidney parenchyma, and the resistance of the kidney is not the same as the function:

the constant gives us the measure of the function; it does not inform us of the resistance of the kidney; so that there will be some deception from this point of view.

3. *The constant is between* 0,100 and 0,200; This is the most difficult case. Some people ask me: at what figure do you operate? I can't answer because one must always individualize.

However, it is possible to settle some general rules having a great influence upon our determination.

First, the constant is not everything; it indicates only the function of the kidneys, but the general state is also to be considered. It is preferable to operate upon a patient with a bad constant and a good general state than upon another with a good constant and a bad general state.

Second, the constant is never definite; it is always possible to improve it by régime, by the treatment of retention and infection. The patient must be operated upon under the best conditions possible for the disease so that it is always a good thing to prepare the patient for the operation, and the constant will show by its improvement the benefit of the preparatory treatment.

Third, when it is not possible to improve the constant its increase obliges us to utilize some measure to reduce the dangers of the operation. For instance, the prostatectomy in half the cases, local anesthesia in the other, will be in some measure indicated in order to reduce the dangers foreseen according to the constant.

We may affirm that with a certain figure of the constant the operation is impossible. But the benefit of the high constant consists in giving us some precious indications concerning the resistance of the individual and concerning urea, by which we may correct this deficiency of the organism.

Kidney Function in Prostatectomy.

It must be realized by one about to undertake the performance of the surgical removal of the prostate gland, that, as a rule, these patients, because of their age and of the usually associated pathological lesions of the heart and kidneys with resultant poor resistance to shock, hemorrhage, and sepsis, form a class of the most unfavorable surgical risks, and that, not only upon the operation itself, but far more upon the functional capacity of the kidneys, heart, and general circulation, does the mortality of prostatectomy depend. This is, then, an operation that requires skillful attention to and consideration of details.—Emil C. Robitschek in *The Journal-Lancet*.

NOTES ON THE DIFFERENTIAL DIAGNOSIS OF VARIOUS TYPES OF RENAL HEMATURIA.*

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In a study of renal hematuria it will be found convenient, from both a clinical and a pathological point of view to divide the cases into two large groups. In the first, could be placed those cases which account for the greater number of hemorrhages, viz, stone, neoplasm, tuberculosis and hydronephrosis. In the second group may be classified cases, by no means infrequent, in which the above conditions can readily be excluded, and in which no gross organic lesions are to be found. On account of the vague and apparently obscure cause of these hemorrhages, this type has been designated symptomless, essential or idiopathic hematuria. In other words, to cloak our ignorance of the real underlying pathological causes a terminology was applied, which in the light of more recent investigations, has been found to cover a number of distinct pathological processes.

A true essential hematuria probably does not exist; it would imply a kidney showing absolutely no minute organic changes. More careful pathological examinations have recently demonstrated that a lesion is present in all cases. Up to within a short time ago, it was the exception rather than the rule, to excise specimens from kidneys at operation, for microscopic studies. No gross lesions being found, it was assumed that there were no organic changes. Later on, sections of the kidneys, or the extirpated organ itself, were subjected to careful microscopic examinations, with the result that changes in the cortex, indicative of a true nephritis, were frequently found. Thus, in time, essential hematuria came to be considered a manifestation of a chronic nephritis. More recent studies, however, have demonstrated that frequently the bleeding is the result of an acute or chronic infectious process showing but few pathological changes in the cortex, but a marked inflammatory reaction involving the medulla and pyramids. As a result of the inflammatory process caused by infections, fibrotic changes take place, which eventually interfere with the return venous circulation. This results in venous stasis; causing hemorrhage by diapedesis or by actual rupture of the capillaries[1]. In two cases recently reported by Quimby[2], in which the kidney had been removed for severe unilateral bleeding, complete pathological studies were made. In both instances the source of the bleeding was from the dilated thin-walled capillaries and veins situated just beneath the epethelium of the pelvis and pyramids. The cortex was not involved. Cases of true renal varix of the papillae also account for some of these essential hematurias.

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*From the Surgical Service of Dr. Beer, Mt. Sinai Hospital.

Renal hematuria should never be classed as essential or idiopathic unless a most careful exploratory operation with removal of sections from different parts of the kidney (cortex and medulla) has demonstrated the absence of any organic change. Most often, the lesion will be found situated in the medulla or on a papilla. Therefore, unless the kidney is bisected, or the papilla inspected through a large incision in the pelvis, the result of the exploration will always remain in doubt.

Renal hematuria due to such conditions as stone, tuberculosis or hydronephrosis is readily differentiated. The main difficulty is encountered in distinguishing between the so-called essential hematurias and the bleeding due to an early neoplasm of the kidney. Of course, in the more advanced cases, no trouble will be experienced; but with small growths which cannot be palpated, or in tumors involving the pelvis of the kidney, the problem is often a most baffling one. Essential hematuria may simulate an early hypernephroma to such a degree, that the diagnosis can be determined only by an exploratory operation. The finding of albumen and casts in the urine is of considerable diagnostic importance in nephritic hematuria. One should not overlook the fact, however, that nephritis may be associated with other organic renal changes, so that the presence of these elements by no means renders the diagnosis certain. In one of our recent cases, which had been treated in another hospital for over a year for a nephritic hematuria, numerous hyaline and granular casts were found in the urine from the bleeding kidney. This had evidently been of considerable influence in establishing the diagnosis of nephritis. A pyelogram, however, showed changes suggestive of a growth, and at operation, a hypernephroma was found. It is the exception, rather than the rule, to find casts in the urine during the attack of active bleeding. The phenolsulphonephthalein test, urea and blood chemistry, may in the early stages of nephritic hematuria show no marked deviations from the normal.

Whenever feasible, the patient should be cystoscoped during the stage of active bleeding; if examined during an interval it may be impossible to determine its origin, whether renal or vesical, unless distinct meatal changes point to one or the other orifice. The possibility of bleeding from both kidneys should also be borne in mind. Accordingly, it is advisable to cystoscope the patient a few times, for only one side may be bleeding at the time of examination.

The differential diagnosis of these cases requires very careful and painstaking study, at times necessitating weeks of observation with numerous examinations before it will be possible to arrive at a definite conclusion. A careful history is of importance, laying especial stress on any recent infection as a possible predisposing source of the bleeding. The value of a thorough physical examination is recognized by all; enlargement or irregularity in the shape of the kidney, should be carefully noted. The urine should be examined a number of times to determine the presence or absence of casts, and tubercle bacilli. Next in order come the following—laboratory and clinical observations, full blood count, blood chemistry, coagulation time of the blood, blood pressure, Wassermann test, eye-ground examination, and radiography of the urinary tract. Should the patient present himself during the stage of active bleeding, it is advisable to cystoscope immediately, as it then is usually a simple matter to locate the source of the hemorrhage. Otherwise, cystoscopy should be deferred until after the *x*-ray examination. Function tests, preferably using indigo carmine, are often of value, especially when the case is examined after an attack of bleeding. The diseased kidney's function is frequently less than that of the normal one. Cultures from both kidneys should be obtained; followed by the passage of a wax-tipped bougie, to exclude the presence of calculus which may not have been demonstrated in the radiogram. Forcible manipulation of the ureter catheter in the renal pelvis, recently advocated by Beer, with the idea of traumatizing a pelvic growth if one be present, and thus producing hematuria, may occasionally be of value. In two recent instances it was found to be of considerable diagnostic importance. Finally in every doubtful case a pyelogram should be made. Pyelography is probably the most valuable differential procedure at our disposal and may clinch the diagnosis, when all other methods fail. In two instances the diagnosis was made entirely upon the pyelogram.

The following cases will each serve to illustrate a different type of hematuria.

Case I—Hematuria due to "Infectious Nephritis."

K. B. Male. Age, 30 years. Patient was perfectly well until a few months ago when he developed an attack of scabies, followed by a crop of furuncles which appeared on the back of the neck. Five days before admission to the hospital, voided bloody urine for first time; accompanied by some frequency, no lumbar pain. The results of various examinations were as follows: General condition, fair, rather anemic, fading scabetic eruption over body, a crop of furuncles on neck. Urine bloody, acid, heavy trace albumen, many pus cells, hyaline and granular casts. Marked pyorrhea alveolares; blood count normal; blood pressure 135/75, *x*-ray and Wasserman reaction negative. Coagulation time seven minutes; blood chemistry shows high nitrogenous retention. Cystoscopy-bladder congested and scattered over its surface are numerous punctuate hemorrhages, with blood-tinged urine observed coming from both kidneys and also obtained by catheterization. No indigo carmine from either side in 30 minutes observation. Cultures from both kidneys sterile, no tubercle bacilli. The bleeding gradually subsided and had entirely ceased within a week. The urinary picture of a nephritis still persists; the blood chemistry remains unchanged.

Case II—Hematuria due to "Infectious Nephritis."

Male. Age, 38 years. This patient had a severe attack of tonsillitis two weeks before onset of hematuria which began one week ago. Since then the urine has been bloody, accompanied by increased frequency of micturition. Physical examination negative. The urine was bloody microscopically, and showed a heavy trace of albumen, 1026 specific gravity. Cystoscopy demonstrated a bladder studded with numerous hemorrhages and swollen ureteral orifices. Bloody urine was seen issuing from both meati and was also obtained by catheterization. The urea output was low on both sides, 0.8%, and cultures from both kidneys showed staphylococci. Examination for tubercle bacilli, and passage of wax-tipped catheter negative. Pyelograms were not made. The bleeding ceased spontaneously a few days after cystoscopy and has not recurred since. No casts were found at any time.

These two cases may be classified as "infectious nephritis." In both instances there was a distinct history of infection, preceding the hematuria. The bleeding, renal in origin, was associated with multiple bladder hemorrhages. The diagnosis of this type offers no special difficulties and surgical interference is seldom indicated as the bleeding usually ceases spontaneously.

Case III—Unilateral Renal Hematuria of Unknown Origin.

Male. G. S. Age, 41 years. Admitted to hospital, June 19, 1920, with a six weeks' history of intermittant, painless hematuria. The bleeding had been very profuse, and was never absent more than three to four days at a time. Urinary history negative except for two attacks of gonorrhea. Nine years previously an epithelioma had been removed from the forehead. Besides hematuria, patient complained of weakness and loss of six pounds of weight. The physical examination was negative. The urine was bloody and contained small clots; no casts or pus was found either during the stage of active bleeding or in the interval. Phenolsulphonephthaleia test, 55% in two hours.

Cystoscopic data—The bladder was normal, also the ureteral orifices. Bloody urine was obtained from the left kidney, clear urine from the right. Good indigo carmine concentration from the right kidney, very weak from the left side. The urine from the left kidney showed blood microscopically with normal urea; the urine from the right kidney showed an occasional red blood cell. Cultures of catheterized urines sterile. Wassermann reaction negative, *x*-ray and waxtipped catheter, negative. Pyelogram of left kidney failed to show any changes characteristic of a growth.

On account of the severe nature of the hematuria, and the history of loss of weight, it was considered advisable to explore the left kidney. At operation a normal sized organ was found with a distinct bulge on the posterior aspect. Incision into this area failed to demonstrate any growth. The pelvis was opened through a nephrotomy wound and explored digitally with negative results. There were no evidences of perinephritis. The kidney was decapsulated, and the nephrotomy wound closed without drainage. Within a week, the urine was perfectly clear. A few days later there was another attack of hematuria. This ceased within a few days. More than four months have now elapsed, during which time the patient has remained perfectly well. The pathological report of sections removed from the bulging aspect of the kidney, showed "marked congestion, especially of the glomeruli, with parenchymatous degeneration." The congestion was probably due to the fact that the renal pedicle was terporarily ligated with a rubber ligature to control bleeding during the exploration.

Comment—No definite pathological entity was found, so that this case might be classified as one of essential hematuria. It must be remembered however, that the exploration was not a complete one, insofar as specimens were not removed from the medulla and the pelvis was not visually examined. It is now recognized that most of the changes indicative of infection or nephritis are to be found in the medulla.

Case IV—Hypernephroma with Metastases in the Renal Pelvis.

L. B. Male. Age, 40 years. This patient was admitted to the hospital July 25, 1920, with a history of attacks of symptomless, intermittant hematuria of one year's duration. He had been treated in another hospital for the preceding year for a nephritic hematuria. The general condition was good, there had been no loss of weight; neither kidney was palpable. The urine on admission was perfectly clear, acid, 1014, with a trace of albumen, and showed a number of hyaline and granular casts. Radiography negative. Cystoscopy demonstrated a normal bladder and ureteral orifices. Clear urine was obtained from both sides with indigo carmine of equal intensity. The catheterized urines showed epithelium, and red cells in both specimens; urea right, 0.3%; left, 0.5%. Casts were found in the urine from the left kidney, none from the right. Cultures negative. Forcible manipulation of ureter catheters in both pelves produced a severe bleeding from the left kidney which continued for a few days. Wax-tipped bougie negative. Phthalein test, 50%. Coagulation time of blood, 10 minutes. Blood pressure, 130. Eye grounds, normal, blood count normal. Urine negative for tubercle bacilli. The patient was observed for two weeks, during which time there were a few attacks of sharp hematuria. Cystoscopy during these attacks verified the previous findings of a left renal hematuria. A pyelogram of the left kidney showed dilatation and irregularity of the calices. Despite the many clinical findings which seemed to oppose the presence of a growth, it was decided mainly on the pyelographic data to explore the kidney. Operation revealed a hypernephroma confined to the upper pole of the kidney. A large deposit was present in the pelvis, which accounted for the severe hematuria produced by manipulating the catheter. Nephrectomy was done, followed by an uneventful convalescence.

Comments—The history in this instance was of one year's duration. This, with no loss of weight, albumen and casts in the urine, led to a diagnosis of nephritic hematuria. Malignancy was suspected on account of the hemorrhage produced by manipulating the catheter in the pelvis, and the pyelographic picture.

Case V—Angioma of Renal Pelvis.

Male. Age, 45 years. History of attacks of profuse, painless hematuria, extending over a number of months. Neither kidneys could be palpated. *X*-ray and all other examinations negative. Cystoscopy demonstrated bleeding from the right kidney. Casts were not found in the urine. On account of the profuse nature of the hematuria a tumor was suspected, and it was considered advisable to explore the kidney. At operation a normal-sized kidney was found; the pelvis, however, felt thickened and was dilated. Incision into the pelvis revealed a large angioma which extended into the calices. It was not considered advisable to extirpate the kidney. There was no recurrence of hematuria for two years following this operation. This case would undoubtedly be classified as one of "essential hematuria," had not the exploration revealed a definite organic lesion.

Case VI—Unilateral Renal Hematuria of Nephritic Origin.

Male. Aged 61 years. Admitted to hospital April, 1920, with a history of four attacks of profuse hematuria, in the past year, at times accompanied by left lumbar pain. No other urinary symptoms, no loss of weight.

Physical examination negative, except that both kidneys could be palpated and the left felt enlarged and irregular. Urine; acid, 1021, red blood cells, occasional white blood cell, no casts, no tubercle bacilli. Radiograms negative.

Cystoscopy—normal bladder, blood seen issuing from left kidney and obtained by catheterization; right specimen normal; urea almost equal on both sides; cultures sterile; wax-tipped bougie negative. Phthalein, 18%. Blood chemistry showed moderate retention. Blood pressure 105/65. Eye grounds, negative. During an interval of bleeding, a few hyaline and granular casts and red blood cells were found. A pyelogram of the left kidney demonstrated dilatation and blunting of calices. and retraction of lower calyx. Despite the presence of a few casts, malignancy of the left kidney was suspected. Exploratory operation demonstrated a small left kidney with a few depressions scattered over the cortex, otherwise nothing abnormal. The kidney was decapsulated and specimens removed from the cortex. Uneventful convalescence. Patient has not had any recurrence of bleeding for the past five months. The sections removed were reported "marked interstitial inflammation with destruction of tubules and atrophy of glomerli."

This case illustrates the difficulties encountered in the differential diagnosis. Whereas the urine pointed to a nephritic condition, the pyelogram was suggestive of malignancy. Despite the negative findings, it is admisable when in doubt to explore, as it is almost impossible to detect early malignancy by any known methods. The value of simple decapsulation in controlling hemorrhage is again exemplified by this case, the second in this series in which this procedure was performed.

References.

1. Payne and MacNider, *Journal of the A. M. A.*, September 23, 1916, Vol. Lxvii, p. 918.
2. Quimby, *Journal of Urology*, Vol. 4, No. 3.

Metastatic Renal Abscess.

The sudden onset of costo-vertebral pain and tenderness, with fever and chills, associated with the presence of a furuncle or carbuncle or a deep-seated suppurative process in another part of the body, renders the diagnosis almost certain. The onset and course are not as severe, or the general prostration as marked, as in the type described by Brewer, under septic infarcts of the kidney.

The local symptoms will depend upon the location of the abscess. Since they are most frequently situated on the posterior aspect of the kidney, the tenderness and rigidity will be most marked in the lumbar region. In one of our cases, the abscesses were situated on the anterior aspect of the kidney, so that the symptoms were more abdominal than lumbar in character, thus simulating gall-bladder disease.—A. Hyman in *The Urologic and Cutaneous Review.*

UROLOGY IN WOMEN.

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The genital and urinary organs in women are so often affected coincidentally or the one become diseased as the result of trouble in the other, that a comprehensive view of gynecology cannot omit a consideration of urology.

For a considerable length of time the gynecologist was wont to call upon the urologist for help in diseases of the urinary organs that complicated disorders of the genital tract.

Dr. Howard Kelly was a pioneer in the study of urinary diseases in women and his first work was so accurate and thorough that most of it appears modern today. Since then gynecologists in increasing numbers have devoted more and more attention to urology until today a gynecological service is not considered complete unless one or more of its members is a competent urologist.

Urology in men and in women has many points in common, but there are a few so different that I do not feel that the urologist without gynecological training will ever be as competent as the gynecologist who has interested himself in urology.

In women the urological condition may be simple and confined to the urinary organs; it may be coincident with but devoid of any relation to the gynecological condition; it may be the result of the same factor as the disease of the genitals but not dependent upon it; and, lastly the one may be dependent upon the other.

Urethral stricture in women is a very rare condition, which is in contrast to the prevalence of this trouble in men. On the other hand, chronic urethritis, with or without trigonitis, is the most frequent condition that we find in the diseases of the urinary organs of women. The lesions are usually mild and it is very seldom that they go to stricture formation. In women, the bladder adapts itself so readily to the pressure and distention caused by growths, malpositions and the pregnant uterus that urinary drainage is seldom disturbed. I think that this free drainage accounts for the fact that we seldom have the severe cases of cystitis found in the male, where stricture of the urethra and prostatic enlargement cause the incomplete emptying of the bladder that is so conducive to the more virulent inflammations.

Calculi in the kidney and the ureters appear to be of the same frequency in the two sexes and necessitate the same surgical problems. Vesical calculi are very rare in women, which is to be accounted for on the ground that the drainage is so excellent. Calculi that enter the bladder through the ureter are expelled usually within the first day, so that they are not factors in the formation of large stones. The vesical calculi observed by me have usually had as nuclei, some foreign bodies that have ulcerated into the bladder, such as sponges, silk ligatures, etc., or were inserted through the urethra, as hairpins, etc.

Fortunately, urinary tuberculosis is a simpler affair in the female than in the male as it is exceedingly rare that genital tuberculosis extends to the urinary tract, a happening not so infrequent in the male. In women, urinary tract tuberculosis signifies the affection of at least one kidney, there being no proved case of primary vesical tuberculosis.

From published records it appears that pyelitis and ureteral stricture are infrequent in the male, while the first is quite common in women and the second far from rare. Pyelitis occurs in girls and women of any age, in the pregnant woman, and quite frequently as a post-operative condition. Pyelitis and stricture are often both present and, not until the stricture is properly dilated does the pyelitis disappear.

A great many men are still skeptical about the occurrence of stricture of the ureter. A demonstration of obstruction to the passage of a ureteral catheter; the hang that is noticed when an attempt is made to withdraw an olive bulb that has passed beyond the stricture; the ureterographic demonstration of a dilated ureter with a point of narrowing below; and relief of symptoms by stretching the stricture, should be sufficient proof of the occurrence of this condition.

Most ureteral strictures are discovered after a patient has been operated upon erroneously for some other condition. As a rule the attacks of pain from ureteral stricture are intermittent, coming on first at long intervals in moderate severity, with gradually decreasing intervals and increasing severity. Just why they should be so infrequent in the male and relatively common in the female, I am at a loss to understand.

The injuries of the bladder, urethra and ureters form an interesting chapter. In the days of poor obstetrics injuries to the bladder and urethra were more common. Now, with better obstetrics, the number is considerably lessened. Formerly, operative injuries of the bladder and urethra were infrequent, but since the gynecologist has become more radical in his operations—especially in the extensive operation for cervical and uterine carcinoma, mishaps to the bladder and ureters, especially to the latter, are more frequent.

The relaxed urethra following difficult labor is relatively frequent. This may manifest itself in degrees varying from the loss of small amounts of urine on severe exertion, to absolute incontinence, even in the recumbent position. Fortunately, it is only the minor grades that are commonly seen, but every few years a few of the more extensive injuries come under observation. This condition is best appreciated and diagnosed by the lack of resistance to the passage of instruments through the urethra, and the failure of the urethral sphincter to properly close over the end of the Gerringer or Kelly cystoscope as it is drawn from the urethra.

In the ureteral injuries we have to determine which ureter is injured; the distance of the injury from the bladder; whether it is a side wall injury; the presence or absence of an infection; the relative and combined function of the kidneys; and whether or not the accompanying pelvic condition will allow of the performance of an operation that will restore the flow of urine to the bladder.

In the cases of new growths in the bladder, I believe that papillomata are as frequent in the female as in the male, but that the infiltrating carcinomata are rarer. The type of carcinoma which the gynecologist most often sees is that which has extended from a cervical growth. Often this extension occurs before vesical symptoms or the appearance of the cervix and vagina arouse suspicion. The practice in all gynecological clinics is to make a cystoscopic examination in every case of uterine carcinoma, so that such extension may be known and deter us from too radical a procedure.

The American Journal of Obstetrics and Gynecology.

Within the past year the *American Journal of Obstetrics and Diseases of Women and Children,* established in 1868 and published by Wm. Wood Company of New York, ceased existence after a long and honorable career. As a successor to this journal there has now entered the field the *American Journal of Obstetrics and Gynecology,* of which the first issue appeared in October, 1920. It is published monthly by the C. V. Mosby Company of St. Louis, under the auspices of the American Gynecological Society, the American Association of Obstetricians and Gynecologists, and the Obstetrical Societies of New York, Philadelphia and Brooklyn. The editor is Dr. George W. Kosmak, New York, who was editor of the older journal. Dr. Hugo Ehrenfest, St. Louis, is associate editor, and there is a large editorial board of prominent American gynecologists and obstetricians.

FURTHER OBSERVATIONS ON GENITAL TUBERCULOSIS IN THE MALE.

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In various publications (*Am. Jour. Urol.*, 1911; *Boston Med. & Surg. Jour.*, CLXVIII, 1913; *Ibid.*, CLXVI, 1912; *Jour. of the A. M. A.*, Dec. 31, 1914; *Ibid.*, LXI, 1913) the writer came to certain definite general conclusions in regard to tuberculosis of the male genital tract. Further observation over a considerable period of years of cases both before and after operation has wrought but little change in these views. Among other conclusions the following seem to be of importance:

1. The epididymis is the primary focus in the genital tract, but
2. This is always secondary to a focus elsewhere in the body, this focus being situated most often in the lung.
3. The prostate and seminal vesicles are invaded by the disease early and often, but after removal of the epididymis clinical cure is finally established.
4. The second epididymis becomes involved in at least half the cases, but involvement of this organ may be obviated by early resection of its vas deferens.
5. Orchidectomy is unnecessary if the testicle is free from disease, and even if affected the diseased portion can be successfully removed in many instances. Even a portion of one or both testicles is worth saving, both on account of the internal secretion and the mental effect upon the patient. After castration the sexual function may be unimpaired.

The question as to whether the primary focus in the genital tract lies in the prostate or epididymis is still under discussion. The result of my investigations, especially those involving end-results, would appear to settle the question in favor of the latter organ.

Primary tuberculosis of the prostate is generally acknowledged to be a distinct rarety, either clinically or post-mortem. A few cases have been reported; some are undoubtedly genuine, but a shroud of suspicion clings to most. If epididymal tuberculosis, which is not uncommon, is always secondary to a lesion in the prostate it would be reasonable to suppose that early cases with the prostate above involved, would be encountered in greater abundance. Neither I nor my colleagues at the hospital have ever discovered a case of primary prostatic tuberculosis in a search extending over several years in a large genito-urinary clinic.

Tuberculosis of the genital tract is very uncommon in children. In the few cases which I have seen there has been no demonstrable involvement of the prostate or seminal vesicles. The reason for this doubtless lies in the fact that these organs are but rudimentary before the age of puberty. If these organs are too little developed to acquire a secondary infection are they not equally incapable of acting as a primary source of the disease? Certainly clinical experience bears out this belief.

Continued observation still enables me to state that the prostate and vesicles, extensively indurated and definitely tuberculous before operation, eventually return to a condition of clinical cure after the removal of the epididymis. The nodularity and induration subside, the bladder irritability ceases, and a urine which was definitely pathological, even at times containing tubercle bacilli, becomes normal. These changes are slow and restoration to normal both subjectively and objectively is not always complete. But the very fact of such changes forces me to believe that the starting point of the disease lies in the epididymis, as otherwise how would the removal of this secondary focus influence a primary focus in the prostate?

Doubtless those who favor the prostate will argue very plausibly that the primary infection of this organ readily explains the occurrence of tuberculosis in so many epididymes on the second side. They entirely overlook the fact that the experience of many observers has shown that the second epididymis becomes involved far less often after removal of the first epididymis than when no operation at all is done. In other words this fact fits in with the observation already made that subsidence of the disease in the prostate is to be expected after excision of a tuberculous epididymis. In the presence of a subsiding process it is unlikely that there would be enough activity to extend to the opposite side. Moreover I pointed out some years ago that the vas of the side last involved is less often and less extensively infected than is its fellow, a fact which would suggest that the tubercle bacillus reached the second side by the blood stream or through the lymphatics. In favor of this view I may mention a case recently seen in which I performed unilateral epididymo-vasectomy ten years ago. The patient has been seen from time to time ever since. The testicle of the side first involved has remained normal in size and consistency, there was no sinus, the prostate has become smaller, less indurated and nodular, and the vesicle on the affected side, formerly indurated and enlarged, has subsided to a practically normal condition. The patient's general condition has been excellent. About a month ago he returned with tuberculosis of the second epididymis. The corresponding seminal vesicle and lateral lobe of the prostate were indurated and enlarged. At operation not only the epididymis but the testicle as well was found to be extensively involved and orchidectomy was done. Radiography of the chest showed a mass of calcified glands about the lung roots. It may be argued by those who favor the prostate that this organ being the primary focus gave rise to the second epididymitis. This ground would appear to be untenable, inasmuch as the prostate had become virtually normal and there were no bladder symptoms to suggest its disease. It is my opinion that the second epididymis became infected by way of the blood stream as did its mate, the primary focus being meantime in the lung.

The diagnosis of tuberculosis of the epididymis is often difficult, especially in the presence of a gonococcal prostatitis. It is well to remember, however, that tuberculosis may invade the epididymis during an attack of gonorrhea. A chronic or subacute epididymitis may be due to the tubercle bacillus, the gonococcus, the colon bacillus or to pyogenic cocci. Only very careful consideration of every point of both subjective and objective symptoms and repeated observations will enable a differential diagnosis to be made. As a moderate degree of hydrocele is often present I believe it is worthwhile to tap the tunical sac and withdraw this fluid. In one case, seen some years ago at the hospital, none of us was able to make a definite diagnosis. Finally the hydrocele fluid was examined and many tubercle bacilli found in the sediment. I was much encouraged by this and have since examined the fluid in a number of cases but without success.

Where a sinus, active or healed, is found in the scrotum I believe that the diagnosis of tuberculosis is certain. No process of which I am aware, other than tuberculosis, goes on to abscess formation with spontaneous rupture and the establishment of a sinus.

In the presence of obvious disease of the epididymis which does not yield to palliative measures in a reasonable time I am of the opinion that the patient should be given the benefit of the doubt and operation advised. This need be but an exploratory procedure under local anesthesia, with removal of a section of tissue for microscopic examination. Two cases which have come under my observation have impressed upon me the wisdom of this procedure.

One case was that of a man of 33 who had been regarded as phthisical for years, although the tubercle bacillus had never been found in his sputum. He was wealthy and had been able to live under the best of conditions. I was asked to see him in consultation with his doctor, an able surgeon, who thought the patient had a tuberculous epididymis. While it was not a clean-cut case of that disease I agreed with the surgeon and advised operation. This was refused by the surgeon, who, as an alternative, sent the patient to the Adirondacks and had tuberculin given. Under this regime the patient's general condition improved considerably, but the process in the scrotum increased in size, and finally an orchidectomy was performed. Examination of the specimen showed sarcoma of the testicle, there being no trace of tuberculosis. The patient died of metastasis about three years later.

The second case was that of a man of 20 who was tall and thin, and who had outgrown his strength. He had consulted a well-known urologist for a painful swelling of the scrotum following an attack of measles. The urologist made a diagnosis of tuberculous epididymitis and adopted the *laissez faire* policy. I was asked to see the case, concurred in the diagnosis of tuberculosis, especially in view of the fact that an appendicectomy done meanwhile had shown a number of enlarged mesenteric glands which were thought to be tubercular, and advised epididymectomy. Finally after some months of palliation, without appreciable effect upon the condition in the scrotum, the patient consulted a third surgeon who advised and performed orchidectomy. Here also examination of the specimen revealed sarcoma of the testicle. The operation was performed about a year ago and the patient is still alive and well, but the history of such tumors does not argue well for the boy's future.

I was wrong in my diagnosis in both these cases, but I was certainly on the safe side in advising operation. The diagnosis of scrotal tumors is notably uncertain and I firmly believe that unless one is perfectly sure of their nature, and this is impossible without microscopic examination, or unless the condition improves under expectant treatment, the mass should be explored and probably removed. Incidentally these two cases are of interest in that the disease was seen at an early stage in both, and in each the swelling involved chiefly the epididymis.

One occasionally sees a patient whose disease is far advanced, with not only renal tuberculosis but an active process in the lung as well. These cases are probably better off without operation, as after all the epididymal process is but a small matter compared with the kidney lesion, and the patient is in no condition to stand nephrectomy. The best of hygienic surroundings, preferably in a first-class sanatorium, together with tuberculin, will tend to reduce the activity of the disease and improve the patient's general condition. Other than this the patient's comfort is about all that one can hope to improve.

The presence of tubercle bacilli in the urine of many of these patients, especially those with renal tuberculosis, should be taken more seriously. These organisms are quite as active as those in the sputum and therefore capable of infecting others. Patients should be instructed in the care of their hands, bed clothing, underwear, urinals, etc., as is the case in lung tuberculosis.

I believe that epididymo-vasectomy is the treatment of choice in these cases. In an early investigation I found that this operation had an operative mortality of 2.66% in 150 cases, there being 4 deaths, all of general miliary tuberculosis. Ether was given in each instance and I believe is responsible for the mortality by its irritating effect upon an active process in the lungs. I have recently had occasion to study a series of 103 patients bearing 114 tuberculous epididymes, seen during the past eight years in the genito-urinary service at the Massachusetts General Hospital. Epididymo-vasectomy, bilateral in 26, unilateral in 56, was done on 97 patients with no deaths. Orchidectomy was necessary in only 6 cases. Ether was given only 23 times, mostly in the early years; the more recent cases had local anesthesia (novocain) 38 times, and spinal (novocaine) anesthesia 10 times. I am now using local anesthesia in practically every case and hear no complaint from the patient during the operation. There can be no doubt that surgical judgment of today must consider the choice of the best anesthetic for a particular case, just as it also involves the question of operability or the type of operation to be performed.

In the belief that the technic of operation which we are performing on these patients, and which was described by Dr. Hugh Cabot and myself some years ago (*Journal of the A. M. A.*, 1913, LXI) should be more widely known I quote its description.

"An incision is made over the epididymis about two inches long. If sinuses are present they should be circumscribed by the incision. This is carried down to and opens the tunica vaginalis, which will in many cases be found adherent to the testicle and must be separated by dissection. The testicle and epididymis are delivered from the wound. The epididymis is then separated from the testicle by a scissors dissection, as in this way the vessels which lie behind the epididymis are less likely to be destroyed. The separation should be begun at the upper pole and carried downward, the epididymis being separated from within outward. When it is free the lower inch or two of the vas should be stripped up by blunt dissection from the structures of the cord. A curved clamp is then applied to the vas and the epididymis and the lower inch or two of the vas cut away. The vas is then stripped up by blunt dissection with the fingers so as to free it from the structures of the cord up to the external inguinal ring. Guided by the finger, the clamp on the lower end of the vas is then passed up to the external ring and carefully inserted into the canal, care being taken to avoid pushing it in front of the canal between the fascia and the fat. The clamp is then pushed upward and outward, following the line of the inguinal canal until its tip lies directly beneath the fascia at the level of the internal inguinal ring. The handle of the clamp is then strongly depressed, bringing the point snugly against the skin. An incision not over half an inch in length is then made on the point of the clamp, which is then pushed out through this incision carrying with it the distal end of the vas. The vas is then picked up, the traction is made so as to pull out the portion lying in the canal so that the remaining portion dives vertically into the wound and over the brim of the pelvis. The finger is then inserted into the little wound, and the vas is freed as far as the finger can reach, making steady traction during this process. A right-angled clamp is then applied to the vas at the lowest accessible point. It is divided, cauterized with phenol (carbolic acid) and dropped back. The wound in the groin is closed with one catgut suture in the fascia, with a silkworm-gut stitch in the skin. The operation is completed by the careful ligation of any bleeding-points in the scrotum. Any apparent foci in the testicle are eradicated with a curette. The wound is painted with tincture of iodin and closed with a subcuticular suture of silkworm gut, leaving a small protective-tissue drain at the lower angle. This drain has been found to shorten convalescence by giving free exit to the serum which necessarily oozes from the raw surface, the amount of which is considerably increased by the application of iodin. The dressing is held in place by the application of an Alexander bandage, one of the many devices of the late Samuel Alexander, which has been a boon to the genito-urinary surgeon. The drain can generally be removed in forty-eight hours and the patient may be up and about in two or three days."

I have already remarked that orchidectomy was necessary in only six of the series just cited. In a few of the epididymo-vasectomies partial orchidectomy was performed on one or both sides. In these cases it is obvious that at least microscopic tuberculosis was left in the testicle, yet this organ overcame this handicap in every instance and no case of secondary orchidectomy has had to be done.

Orchidectomy is occasionally necessary even though the testicle is but little or not at all affected. I refer to those cases wherein there is a massive tuberculous infiltration, not only of the vas but of the whole spermatic cord as well. The tuberculous deposit is so interspersed among the vessels of the cord that its removal necessitates destroying the blood supply. But even this amount of tuberculosis may at times be left undisturbed as has been demonstrated by a patient in whom this condition obtained and upon whom I operated last August removing only the epididymis and vas deferens. The patient was willing to take the chance of a second operation being necessary, but up to date the process has shown no evidence of development; on the other hand the cord is less indurated and thickened at the time of operation and behaves as if it it would eventually quiet down.

None of our patients is known to have had a persistent or even a temporary sinus from the stump of the vas where epididymo-vasectomy was done, by the method described, a point which is in striking contrast to the operation of earlier days when the vas was cut off at or near the external inguinal ring, and in some cases was actually sutured to the skin for its better drainage. Needless to say this drainage maintained itself in the form of a sinus for weeks, months and sometimes years. By amputating the vas well beyond the internal inguinal ring the section is made at a point where there is the smallest amount of tuberculous disease and the stump is deeply buried.

Radical operations involving the removal of the prostate and vesicles, as well as of the testes, vasa and epididymes were advocated and practiced many years ago by different European surgeons. Whiteside, and more recently Quinby and Young in this country, have carried out these radical measures in the belief not only that the primary focus lay in the prostate, but that better results were to be looked for. While due credit must be given them for their skill I feel that the operation which they advocate is unnecessarily mutilating and that after all is said and done the ultimate results are no better than those obtained by more conservative surgery. No operation will remove all traces of the disease, and an old process in the lung lurks constantly in the background to break into renewed activity after a quiescence of many years.

In closing I wish to state that all patients, both hospital and private, should be carefully and frequently scrutinized by an efficient follow-up system. Each patient is urged to return not only for tuberculin but also for observation. For many years my colleague, Dr. John B. Hawes, 2nd, has carried on a most successful tuberculin clinic at the Massachusetts General Hospital. Patients with surgical and urological tuberculosis report there once a week. The temperature, pulse and weight are regularly recorded and the local and general condition are gone over. The dose of tuberculin is carefully graded for each patient, increased slowly at each visit until the maximum dose is reached, and continued until objective and subjective symptoms have improved or disappeared, this process taking weeks or months. My own observations of this post-operative treatment of the urological cases convince me that although tuberculin is but a factor it is of enormous help when combined with other hygienic measures in which the patients are instructed at each visit. While the use of tuberculin must be well understood and its possibilities for untoward effects realized it can be employed with comparative safety by the average physician.

REBELLIOUS SUPPURATIVE CYSTITIS. TREATMENT BY CONTINUOUS HOT IRRIGATION.

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The more general recognition of cystitis as a morbid entity due to infection of tissues reduced in resistance by some other cause, the infecting agency being of a progredient nature either from above or below or of hematogenous origin, has enormously improved the prognostics of this ailment, but the rather dogmatic position which this assertion has acquired and the consequent impression that once the cause is discovered and removed, the cystitis will clear without much more trouble, is being shaken by further observation and experience. This statement has no reference to such conditions as Hunner's ulcer but to those of the chronically suppurating type. The bladder which in the beginning suffered from the other organs, now, in consequence of serious interstitial changes and deep infection of its substance menaces the other organs as a distributing focus of infection and threatens the somatic integrity of the patient by severe suffering and septic toxemia. The dictum of Bazy that a prominent feature distinguishing cystitis from lesions of the upper urinary tract, is the preservation of general health, must not be allowed to expand into a belief of the benignity of vesical suppurations as Brewer has demonstrated the dangers of metastatic accidents to the kidney from local suppurations, especially of the lower urinary passages. Recent animal experiments of Eisendrath and Kahn appear to confirm the claims of Sampson and Bauereisen that the lymphatic capillaries of the bladder and ureter are very active in the matter of distributing infection to the kidneys and perinephric tissues. The infected vesical tissues may easily act as reciprocal infectors.

Most cystitides, it is true, will clear up after removal of a diseased kidney or calculus, prostatic or urethral obstruction, suppurating seminal vesicle, prostatic calculus or abscess, but in spite of well-considered treatment there is a goodly number of vesical suppurations going about notwithstanding that the primary and proximate causes have been removed. In other words the cystitis has become the main pathological entity. Why? Because the three predisposing factors of trauma, congestion and urinary retention or a combination of any or all of them substantially continue in operation. We are not speaking of pyelitis or concealed stone masking symptomatically as cystitis. Vesical inflammation of long standing leads to textural changes in the mucus and muscular coats of which thickening and ulceration, more or less deep, and muscular atony and atrophy, more or less extensive, are the usual consequences. We have here the explanation of the pain and urinary urgency and also of the atony so often encountered in rebellious cases of suppurative cystitis.

The most important elements in the treatment of purulent cystitis are to keep the bladder continuously clean and to improve the nutrition of the local tissues. The vesical membrane being more or less ulcerated and covered with firmly adherent muco-purulent masses, often incrustations, the futility of irrigations, as ordinarily administered, becomes evident. Such bladders are therefore cauterized with solid silver nitrate, fulgurated and burned with the actual cautery "practically through the whole thickness of the bladder wall," but very few are cured because such efforts are circumscribed and, after all, the ulcer merely represents one of the consequences of, but not the whole disease.

In 1896, a man about 41 years old came into my service at the Alexian Brother's Hospital of Elizabeth, N. J., for observation and possible relief from severe urinary tenesmus, pyuria and failing health. He had had undergone a cystotomy eight years before on account of stone and cystitis, followed by a long period of irrigations with various substances, but no decided improvement. Two years later perineal section and drainage with more irrigations but only temporary relief. Had lost sixty pounds and was getting weaker all the time. He was in wretched condition, evidently slowly dying of exhaustion from pain and sepsis. While I was making up my mind what to do with this man I became convinced that irrigations as ordinarily given amounted therapeutically to simple instillations of mild antiseptics, good enough for mild inflammations but wholly unable to meet the requirements of severe and obstinate cases. The patient's urethra had become so intolerant that he declined any treatment through that channel. It was decided to do a suprapubic cystotomy, put in a delivery tube, also a perineal section and insert a drainage tube into the bladder, then connect the feeding tube with the hot water supply and run a continuous stream of sterile water through the bladder at the maximum temperature and maximum pressure the patient would be able to stand with perfect comfort. An ingenious member of the nursing staff constructed a pipe with coil and cooler, there being a two-way cock between the coil and the patient. By this method it was thought that we should supply the therapeutic indications of hydrostatic attrition for the purpose of removing adherent secretions not only from the vesical surface but likewise from beneath folds and diverticles, effect thoroughly the mechanical removal of bacteria, secure the well-known soothing action of heat on the painful bladder and stimulate cellular metabolism and local phagocytosis through the alterative and roborant effect of moist heat, in order to permit of regeneration of a serviceable viscus. Relief of pain was striking. Irrigation was continued without interruption day and night for three months. The patient recovered and when last seen five years after his discharge from the institution, he was symptom-free. The urine showing merely a slight excess of mucus and an occasional leucocyte. The streptococcus could not be found any more.

This method is intended as an extraordinary measure for rebellious cases only; on the other hand, it is neither dangerous nor difficult. It is certainly free from such punishment as is inflicted by the nitrate stick or cautery, besides being a remedy that treats the whole disease. It may be used whenever the patient's condition gives the least hope, as the inlet tube can be inserted under local anesthesia through the canula after suprapubic puncture according to the method of Belfield. In most patients the urethra will tolerate a retention catheter so that the washwater can be carried off in that way. The main points are a continuous flow of sterile water as hot as the patient can comfortably bear (90°-110° F.) under sufficient pressure to thoroughly flush the viscus without overdistention, for anywhere from eight to twelve weeks. The tubes are then removed and the urine carefully watched. If necessary the tubes can be reinserted for an additional course.

The thickened and painful bladder remaining after healed tuberculosis will tolerate only the slightest distention but does well on a higher temperature of the water than the other types of purulent cystitis. This method is also effective in rebellious pyelitis when a stubborn bladder infection is preventing the renal disease from clearing. Marion has used cold water in this way after prostatectomy for the purpose of preventing hemorrhage and sepsis. He claims to have been successful in every case so treated. For the writer the presence or strong suspicion of vesical infection in bladder casualties has always been an indication for continuous irrigation for several days until the danger of sepsis seemed averted. The irrigation should, however, not be made under much pressure because of the likelihood of reopening the vesical rent. When there happens to be concomitant spinal injury the drain tube should be inserted through a perineal opening, because in such cases there is very apt to be urethral sloughing from a retention catheter in the urethra. In his recent Hunterian lecture, Walker states that he also has employed continuous irrigation for a few days with excellent results, in his gunshot bladder casualties.

This method will not cure everyone but the practitioner who applies it with judgment will surely find a larger number of cases of rebellious suppurative cystitis restored to functional integrity.

TRAUMATIC ORCHITIS.

Speaking in a general way, contusion of the testicle presents three degrees, namely, interstitial blood suffusions, hematoma of the testicle, and rupture of the albuginea with hernia of the seminiferous tubules. To effect the latter lesion a pressure of fifty kilograms is required. A certain degree of contusion of the scrotal integuments always exists but suppuration is rare.—*Medical Record.*

RADIUM THERAPY OF CANCER OF BLADDER AND PROSTATE.

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The urinary bladder offers a field of predilection for radiotherapy because the knife is pretty well discredited as a means of dealing with malignancy of bladder and prostate and because the palliative and curative potentialities of radioactive substances while admittedly existent do not imply any primary mortality or the enormous suffering following relapses after cutting operations.

Since experiences in radiotherapy have accumulated and have been sifted it is now possible to avoid the infliction of damage and to select time and methods of application, that will ensure the greatest possible advantages. While it is true that the character of the tumor is the most essential feature in furnishing or denying therapeutic success, still it seems that the time and mode of application and the calling in of preparatory and additional measures are apt to influence the results obtained. It is known at the present time that in any object that is exposed to rays another system or complex of secondary rays is set up—the character of these secondary rays depending not only upon the nature of the primary source of the rays but also upon the material that is interposed between the source of the rays and the object to be rayed, in other words it depends on the filter employed in order to ward off the soft rays and permitting only the hard ones to reach the organ or tumor in question. This fact explains that in some instances even at a remote date changes may occur produced by secondary rays also in organs quite distant from the tumor that was meant to be treated by rays. Heavy zinc and lead filters have proven to be particularly prone to produce such untoward results, among which perforation of a bowel may be quoted as one of the most dangerous accidents.

Gold seems to be the best material for radium filters in bladder work and that for two reasons: On account of the high atomic weight of this metal the filtering capsule does not have to be very thick, which permits easy introduction through the natural channels, and in eight years of experience we never had occasion to notice any remote or long distance damaging of pelvic or abdominal organs.

As to the time of radium application we distinguish between primary application, raying following electrocoagulation of the tumor, and prophylatic raying secondary to the excision of the growth. The time of the primary introduction of radium into the bladder will depend on the condition of the viscus. If there is no appreciable cystitis the radium may be inserted without any preparatory steps. But if pronounced cystitic changes are present, it is of great advantage to submit the bladder to some preliminary treatment. Two benefits are obtained in this way; the inconvenience caused to the patient by the insertion of radium is reduced to a minimum and the control of the action of the radium is facilitated.

An inflamed bladder is rather intolerant toward the introduction of a foreign body and the suffering of the patient is unnecessarily increased by such an interference. On the other hand, the radium will always produce a certain reaction inside of the viscus—if the cystitis is not cleared up previously to the insertion of the radium, it will be very hard to decide how much of the irritation and subsequent changes in the mucosa have to be blamed on the cystitis and how much on the radium.

If we have to deal with ammoniacal cystitis, we will attempt to acidify the urine by giving some mineral acid per os, at the same time trying to quickly improve the local condition. In this category of cases the instillation of small quantities of pyoktanin solution, 1-5000, gives good results. As soon as the urine is deodorized instillations of iodoform-oil emulsion, ten per cent., are employed. In other cases of cystitis we start right away with the iodoform administration, which not only will help in ameliorating the local condition but also acts as an excellent anodyne. The radium therapy is started as soon as the cystitis is cleared up.

In cases in which frequent and copious hemorrhages prevail it will prove to advantage to irrigate the bladder several times with a 1-000 silver nitrate solution, until the urine clears up.

Tumor cases that are accompanied by infiltrating cystitis of such a degree that the bladder is unable to retain even very small quantities of urine are not proper objects for primary radium application.

Such bladders are opened by the suprapubic route which procedure answers two demands. The annoying strangury is relieved and at the same time the tumor or tumors are made easily accessible for the treatment preparatory to the application of radium. This preparatory treatment consists in electrocoagulation of the accessible parts of the growths. The surgical diathermy immediately does away with hemorrhage and pain and furnishes incidentally another advantage—the stimulation of a malignant tumor occasionally observed under raying never occurs in instances of electrocoagulation previously accomplished.

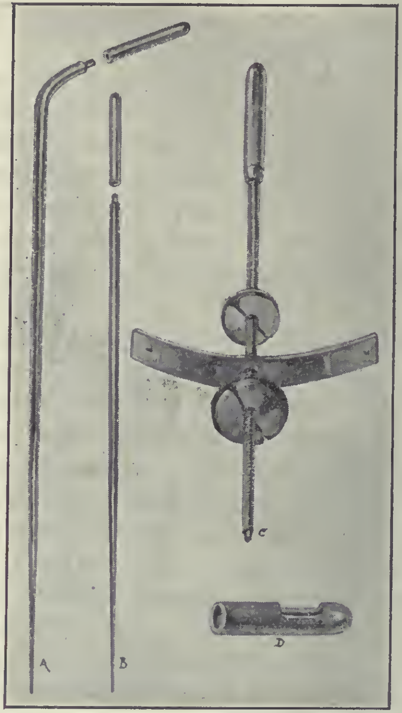
The radium treatment may follow immediately the coagulation of the growth; in fact the radium rays seems to enhance and accelerate the detachment of the eschar produced by the diathermy.

Prophylactic treatment after the excision of tumors of the bladder is started as soon as the first wound reaction has subsided. The application of radium to prostatic cancers is conducted on the same principles. It may be mentioned in addition that prostatic cancers causing pronounced pains due to the capsular tension, that are not promptly relieved by radium, call for suprapubic opening of the bladder and electrocoagulation of the prostatic tumor.

The technique of the radium application depends principally on the question whether the bladder is open at the time of the intended radiotherapy or whether it is desired to insert the radium through the natural channels. All the cystoscopic appliances devised for the purpose of placing the radium container on certain spots and keeping it there are not only unnecessary and lead to torturing the patient with bulky instruments, but will always fail in their purpose.

If a tumor is amenable at all to radium treatment, it will respond by involution even if only one part of it is exposed to the therapeutic rays—this empiric knowledge is supported by theoretical reasoning: it becomes more and more probable that the curative success of radiotherapy is based on the production of defensive and protective ferments and not on any direct destructive action of the rays on the tumor cells. It is furthermore impossible to keep any foreign body close to and in permanent contact with any spot inside of a closed bladder. The apposition of a foreign body will always excite in a shorter or longer time partial contractions of the bladder wall so that it will crawl from under any such pressing object. The truth of this statement may be verified by cystoscopic and fluoroscopic observation.

For the placing of radium or similar substances into the unopened bladder we use silver sounds the tip of which consists of a detachable hollow gold tip of 3-millimeter thickness into which the glass container carrying the radioactive substance is placed. This sound has a caliber of 21 Charrière. In order to prevent pressing of the bed-covers on the handle of the sound the lower part of the patient's body is protected by a crate. In practically all the cases any artificial fastening of the sound will be unnecessary; the majority of patients are very tolerant toward this sound, and only in very sensitive individuals will the administration of a morphine suppository (rectal) be necessary. The patients either urinate spontaneously alongside the shaft of the sound, or if they are unable to do so, the sound is removed at regular intervals to permit micturition. Frequent urination is encouraged to keep the bladder contracted. This, together with the fact that the irridation of radium through a gold container will always extend to at least four centimeters distance, will always ensure that at least one part of the tumor is under the influence of the therapeutic rays. If the bladder was opened previously to the radium application the container and filtering capsule are dropped into the bladder through the suprapubic opening. A string or chain is attached to the capsule and fastened to the abdominal skin, so as to permit prompt removal.



A, Sound for Males; B, Sound for Females; C, Carrier with Adjustable Crossbar; D, Fenestrated Lead Cap.

If no gold filter is available the capsule before application must be wrapped up in a cover of pure rubber in order to prevent secondary surface irradiation, that may produce very disagreeable burns. We leave the radium container for 24 hours in the bladder and repeat the sittings once every week, utilizing the intervals for antiseptic treatments of the viscus. If for some reason it is deemed advisable to apply to a prostatic tumor the radium per rectum special precautions have to be taken, because the rectal mucosa is very susceptible to the destructive influence of radium rays.

In addition to the filter the mucous membrane has to be protected in such a way that even the gamma rays will hit only this area that corresponds with the prostatic surface facing the anterior rectal wall. For this purpose a heavy lead cup is slipped over the filtering capsule. In this cap a little fenestra is cut; the container is then placed into the rectum in such a way that this opening lies against the prostate, while the balance of the rectal ampulla is entirely screened off. In order to maintain the capsule in this position it is connected with a stiff rod that carries a curved crossbar. This crossbar is adjustable. After proper placing of the capsule the crossbar is made to fit into the anal rim, in which position it is fastened by tape or adhesive strips.

From our experience we feel justified in stating, that the injection of proteids into the prostatic tissue seems to enhance the radium action in a decisive way. We use for this purpose proteus enzyme prepared after Kendall's method.

In a general way it may be said that if a few radium treatments do not produce decided improvement continuance is hopeless and we have to resort to electrocoagulation.

The first sign of damage done to the vesical mucosa by radium is the appearance of multiple small blisters, and extreme irritability of the bladder is perceived by the patient.

An amount of fifty milligrammes of radium or mesothorium is sufficient for the application to vesical or prostatic tumors. The formerly cherished supposition that very large quantities of radium will accomplish what reasonably large quantities could not achieve is more and more relinquished by radium therapists. Experience has led also to the abolishment by a good many of tunneling or needling tumors with the view to multiple insertion of radium. The results are not any more favorable while the suffering of the patient is increased and the danger of superseding infection is invoked by these methods.

CHANCROIDS.

In cases of multiple chancroids on a long prepuce where rest in bed cannot be insisted on, and in cases of chancroids beneath a tight prepuce where a dorsal or bilateral incision is indicated, complete circumcision will follow with no bad results and it will probably shorten the time required for treatment by the conservative method.—SAMUEL NEWMAN in the *Virginia Medical Monthly*.

FURTHER PROGRESS IN THE TREATMENT OF TUMORS OF THE FEMALE BLADDER.

WILLIAM NEILL, JR., M.D.,
BALTIMORE, MD.

No more distressing condition, from the patient's standpoint, is met with than tumor of the female bladder, and no other condition offers greater difficulties from the standpoint of effective treatment. This condition is met in all periods of life, but as is the case with all other tumors, is more common after middle age. The course is prolonged, the tendency is for the condition to remain confined to the bladder, and it may continue benign for years. Approximately one-half of these tumors are malignant, and the majority of the others become malignant at a later period. These tumors exist in two common types: coarse, or fine villous growths with a narrow pedicle; or flat and lobulated with a broad, sessile base.

The question of diagnosis is usually not difficult. Any patient with a history of bladder irritation and hematuria should be examined with the cystoscope. For this we are using the Kelly open aërocystoscope with the patient in the knee-chest position. This presents incontestable advantages for seeing these tumors in their actual state and in determining their number, position, and relation. A characteristic and definite clipping can be easily taken from the base of the tumor, under direct sight, for microscopic study. The benign growths cannot be palpated on bimanual examination as there is no existing underlying induration, but broad, flat, sessile tumors can be felt, and are in every case malignant. All patients with hematuria should be cystoscoped with this condition in mind. Neglect to do this has allowed many a small and easily treated papilloma to develop from a benign to a malignant one, and a comparatively simple condition to reach a most serious proportion, with the case desperate, and the treatment extremely difficult, and unfortunately less effective.

The etiology of this condition, as is true of new growths situated elsewhere, is not definitely established. Some observers contend that in a large percentage of cases there is a history of chronic cystitis, or stone, or some form of long-standing bladder irritation. In our series we have found this element negligible.

The first great step forward in the treatment of this perplexing situation was brought about by the pioneer work of Edwin Beer. Fulguration has become by common consent the method of choice for all cases in which it can be applied. There is still a small group of cases which we are inclined to reserve for open surgery. This refers to the huge massive tumors which almost completely fill the bladder. The routine surgical removal, which at its best is a most dangerous and difficult procedure, is attended by a most distressing number of recurrences, estimated as high as 75%. Complete cystectomy is discouraging as there is a very high immediate mortality and the end-result is not favorable, Gardner (Trans. *Am. Urol. Assn.*, IX, 226, 1915), reports 96 cases of benign papillomata removed by excision with recurrence in 36%, while in 61 cases treated by fulguration alone there was recurrence in 13%.

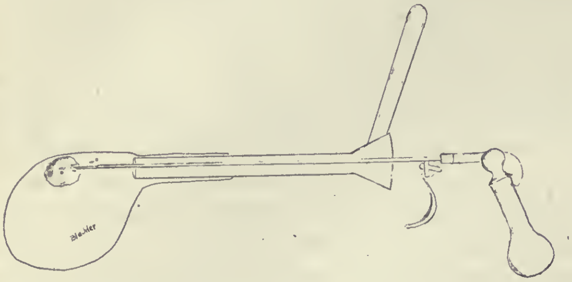


Fig. 1—Radium emanation in glass capillary tube; (a) implanted into tumor and left permanently; (b) left ureteral orifice.

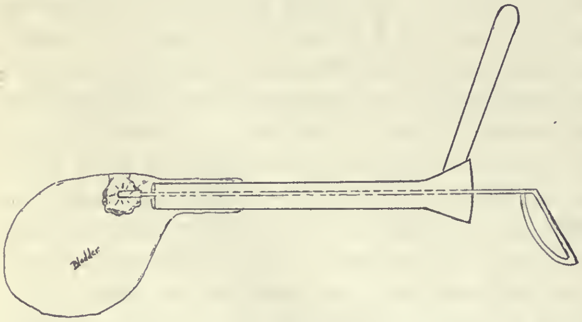


Fig. 2—Radium emanation encased in a brass capsule; (a) attached to sound and held against the tumor under direct vision, through a No. X Kelly cystoscope.

Our method of treatment during the past five years has drawn us further and further away from any operative procedure, except in the cases of massive tumors. The treatments can be given with great ease and accuracy through the Kelly cystoscope. Our best results have been obtained by the use of radium. The flat tumors with broad sessile bases are treated by implanting (or shooting) directly into the tumor, tiny capillary glass tubes containing from 3 to 5 mc. of the radium emanation, which are left permanently, and which give a tremendous radiation throughout a long period (Fig. 1). From one to several of these "spicules" may be implanted, depending on the size of the growth. This form of treatment should never be repeated under four to six weeks. In association with this method and also for the smaller definitely pedunculated tumors we treat with the emanation attached to a sound and encased in a brass or platinum capsule, which is held directly on the tumor (Fig. 2). For this we use the equivalent of one gram of radium in the form of emanation and treat on an average of from five to ten minutes on each existing tumor. Such cases are ambulatory or office patients and are examined and treated on an average of once a week for from four to five weeks. At the end of that period all treatments are discontinued and the patient allowed to go off for six weeks. Then another examination is made and the treatments again instituted, depending on the amount of trouble found remaining. With this method of treatment, instead of putting the patients to bed and exposing them to the risks and discomforts of an operation, we handle them simply as office cases, and in the meantime they lead their regular lives at home. Patients are never discharged as cured, but even after the last vestige of trouble has disappeared they are instructed to report at regular intervals for examination. The tendency to recurrence is so great that in this way we are able to treat a recurrence as soon as it becomes evident.

We have been using this form of treatment for the past three years with most gratifying results prompting us to further investigations along this line of therapy in the hope that in the near future the ideal radium technique might be realized to properly cope with this most distressing condition.

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Cancer of the Bladder.

Since carcinoma of the dome usually penetrates all of the bladder wall and the peritoneal coat, a part of the peritoneum must be excised. Transperitoneal operations are reserved for cases in which the peritoneum is involved. Although opening the peritoneum complicates the operation, it should be done if it is necessary to the performance of a complete operation; but it is not an aid in operating for the tumors of the base of the bladder, and therefore should not be made. A large incision down to the peritoneum, however, is very essential for exposure.

While the results obtained from radical operations for cancer of the bladder are not so good as we hope they will be in the future, they are not altogether discouraging.—E. S. Judd and W. E. Sistrunk in *The Journal A. M. A.*

REMOVAL METHODS FOR BLADDER STONES.

Bransford Lewis, M.D., B.Sc., F.A.C.S.,
St. Louis, Mo.

The methods of removal for bladder stones have within late years been reduced practically to the following:

(1) Removal by litholapaxy, (a) under general anesthesia; and (b) under local anesthesia.

(2) By suprapubic cystotomy; (a) under general anesthesia; and (b) under local anesthesia.

Without reciting or discussing the numerous other methods that have been utilized for this purpose in the past, and that have been found lacking for various reasons and have therefore been placed in the discard, the ensuing remarks will be confined to the above-mentioned methods.

Litholapaxy.—In advocating this method Bigelow made use of the fact, previously determined by Otis, that the male urethra would tolerate the use of larger instruments (lithotrites, etc.) than had theretofore been recognized. This permitted the construction and use by Bigelow of stronger and more reliable instruments, not only for crushing stones within the bladder but also for their more prompt and effectual removal through the large-calibered washers that he also devised.

The promptitude and completeness of removal of the crushed fragments of stone was claimed by Bigelow as a markedly conservative feature of the method in respect to the mortality connected with the operation; and, as a matter of fact, litholapaxy eventually did considerably reduce the mortality of crushing operations.

Formerly the operation was done habitually under general anesthesia, but later the various methods of supplying local anesthesia have been improved to such a degree that it is the author's belief that one or the other of these is customarily used at the present time.

Following the usual aseptic or antiseptic preparation, two ounces of a one per cent, procaine solution may be injected into the emptied bladder, after which the deep urethra may be well anesthetized by dropping tablets of cocain (one and one-eighth grain), alypin or procaine into the deep urethra through the author's tablet depositor. One, two, or three of these tablets may be used until the patient declares that the sensitiveness at the neck of the bladder has been relieved. Through the same depositor tube six or eight ounces of warm water are introduced into the bladder, giving good working space for manipulation with the lithotrite.

This instrument is next introduced into the bladder, the patient being preferably in a semi-sitting posture, shoulders elevated and the knees resting in the knee-crutches of the cystoscopic operating table. The jaws of the lithotrite are opened within the bladder while the beak points toward the head of the patient. If the beak be pressed down into the base of the bladder during the process of the opening of the lithotrite there is much greater likelihood of promptly catching the stone and grasping it firmly in the jaws. On accomplishing this the lithotrite is lifted from the floor in order to avoid including the bladder mucosa in the grasp; the beak is brought out into the center of the bladder cavity, so to speak, and the crushing is accomplished by turning the mechanism in the handle. The grasping and crushing are repeated a number of times until the fragments are reduced in size sufficiently to pass through the washer freely. It may be necessary to turn the beak not only toward one side or the other of the bladder cavity, but also directly posteriorly in order to grasp the lesser fragments for further reduction.

The stone washer tube is introduced in the bladder following the removal of the lithotrite. The washing bottle filled with warm water is applied to the outer end of the tube, and the rubber bulb is then alternately compressed and expanded with the object of pumping the débris and small fragments of stone from the bladder. This appears in the wash bottle as a cloud of broken calcareous material.

When it is thought that all the material has been removed, the cystoscope is introduced into the bladder and if a few fragments are found they may either be crushed and removed through the washer or, if small enough, they may be grasped by the ureteral alligator forceps and drawn directly through the cystoscope sheath, or drawn out together with the cystoscope and forceps, if too large to pass through the cystoscope sheath.

Removal by Cystotomy.—The operation of suprapubic cystotomy under general anesthesia is so well understood at the present time that it is unnecessary to enter into a discussion of it. Suffice to say that it may be done under either gas or ether anesthesia or a combination of both.

Supra-pubic cystotomy done under local anesthesia has within late years become very popular and frequently adopted, particularly in cases of advanced age or great debility. It is perfectly feasible and highly gratifying, carrying the patient through the operation without shock or serious objection from any standpoint, save in those very nervous individuals who have to be given some general anesthetic for their nervous sensibilities rather than for the prevention of suffering.

With the preliminary morphine injection, with the patient in a semi-Trendelenburg position, the bladder fairly well filled with warm sterile fluid, a line of infiltration after Schleich's method is effected for four inches above the pubis.

The first injections are made intra-cutaneously and the next are made sub-cutaneously; and when the incision has opened up this much of the wound, it is followed up with deeper injections into the fascia and depths of the muscular wall of the abdomen. The muscles are separated, the incision being carried well down toward the symphysis pubis. On reaching the pre-vesical tissues in the space of Retzius similar injections of Schleich fluid is introduced into these tissues.

It is well at this point to abandon the use of the knife in order to avoid incising the peritoneum, even though the bladder be well distended. The forefinger of each hand of the operator is covered with gauze and the bladder wall is exposed by blunt dissection with these two fingers, the fold of peritoneum being brushed upward and held in the superior angle by means of the retractor covered with gauze.

Before incising the bladder wall traction sutures of catgut are applied through it, one on each side of the median line, and then the bladder is emptied of its fluid contents by the catheter that has been left in the bladder since the beginning of the operation. By thus emptying the bladder by siphonage a comparatively dry field is obtained, instead of a sloppy one.

The vertical incision in the median line of the bladder is next made, sufficiently long to permit the removal of the stone or stones. This is accomplished by stone forceps or stone scoops; after which provision for draining is made by inserting a rubber elbow tube into the suprapubic opening and closing the bladder wall snugly around it with chromatized catgut sutures. The muscular walls are closed with interrupted catgut sutures and the skin with silk-worm gut. Complete drainage is well secured by means of one of the periodic suction apparatus on the market, such as that of Bremmerman. After a few days of drainage in this manner the suprapubic tube may be removed and the wound edges may be brought together by adhesive strips; at the same time drainage may be effected by an in-dwelling urethral catheter.

550 Century Building.

A NEW PRINCIPLE APPLICABLE TO THE TREATMENT OF GONORRHEA.

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I published a preliminary note on a new principle for the treatment of gonorrhea in the *New York Medical Journal,* March 1, 1919, which should appeal to every urologist. It can also be utilized in any local infection as well as for gonococcal infection of the urethra. I have successfully used it in my private practice and in the genito-urinary clinic of the New York Hospital. Briefly, it is the introduction within the cytoplasm of the gonococcus, of a soluble agent which when injected into the urethra will penetrate the cell wall and reach the nucleus of the gonococcus without irritating the urethral mucosa. Such an agent must not be astringent nor produce any untoward effects liable to increase inflammation of the already congested lumen. This can be accomplished by a number of agents, notably by some alkaloids, amido-derivatives and aniline dyes. I show no preference to any one of them, because I consider that the chemical agent acts in a purely mechanical manner when "developed," as it were, by a second reagent, which must also be neither irritating, caustic, acid nor astringent and which in turn, will penetrate the cell wall of the diplococcus and reach its cytoplasm and nucleus, producing within the cytoplasm of the gonococcus cell-wall, chemical molecular exchange with formation of an insoluble, ponderable and voluminous precipitate.

It is reasonable to suppose that mitosis would be materially interfered with by the production of a dense precipitate within the cell, and that the chromosomes would be unable to perform those changes which result in cell multiplication, if what I have explained is brought about. This can be actually seen under the miscroscope by anyone who will take the trouble to stain large epithelial cells with dyes of various colors which precipitate one with another. Take, for example, pavement epithelium and stain with methylene blue, or cover the slide with a solution of quinine bisulphate. Wash the slide and again treat (this time while the slide is under the microscope) with a solution of picric acid. In both cases, the cytoplasm and the nucleus will show a distinct change of color, which proves that chemical exchange has taken place inside the cell. Of course, these changes take place in all cells of the urethra which stain with dyes or are chemically affected by colorless agents, but since the cells of the urethral mucosa are constantly being shed, this is of no importance. It is not claimed that by this principle we destroy the gonococcus (or any other cells) but certainly we prevent proliferation of stained gonococci so treated, and these are sloughed off with the pus and reproduction having ceased, the discharge disappears.

Whatever may be the scientific explanation, treatment with a sensitizing agent followed by a developing agent within the infected urethra will in many cases cause the gonococci to disappear from the urethra in from 24 to 48 hours. Why this is not always the case, I attribute to imperfect technique or too great haste in applying the treatment before the most severe inflammatory symptoms have been relieved by hot water compresses, bathing, and internally, bicarbonate of soda and bromides or something to soothe the intense irritation of the urethral canal.

I have made hundreds of experiments with various agents which it is unnecessary to mention because I find one just as good as another if the principle of treatment is kept in view.

Since beginning my experiments, Dr. Hugh Young, of Baltimore, has published his results with *mercurochrome*. I have used this as I have acriflavine, tolulol diamine and many others, but I find none has any special advantage. I am now using, principally, methylene blue as a sensitizer, and picric acid as a developer.

Technique.—Wash the penis carefully; introduce a *very small caliber* soft rubber catheter about 2 inches into the urethra, so as to allow return flow of any fluid injected. Connect this catheter with a long funnel. Any one of the following sensitizers may now be used:

Methylene Blue	1/2000
Acriflavine	1/3000
Tolulene-diamine	1/3000
Diazine Black	1/2000
Bisulphate of Quinine	1/500

(Any of these solutions give a heavy precipitate with solution of picric acid.)

Pour into the funnel 15 c.c. of any one of these sensitizers; allow it to enter the canal by gravity. Before the last few drops have left the funnel, add about 10 c.c. of solution of picric acid, 1/4000; allow this to run into the canal until the funnel is empty. All that now remains to be done is to wipe the liquid away from the parts to prevent soiling of linen.

This treatment may be given twice daily if convenient. In cases of posterior involvement,—it is necessary to introduce the catheter into the bladder and to use about 30 c.c. of the sensitizer. The catheter is then withdrawn and the bladder emptied. Now introduce the catheter a second time and pour into the funnel 15 c.c. of the picric acid "developer"; withdraw the catheter and again void the liquid. In this manner, the whole urethral lumen is covered by the reagents.

The only objection to any of these methods is the liability of staining the patient's clothes, but with careful manipulation and practice, this difficulty can be overcome to a large extent.

16 Fifth Avenue.

CHRONIC URETHRITIS.

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Chronic inflammation of the urethra is usually but not invariably, a sequela of gonorrhea. Exception is taken to the caption "chronic gonorrhea" because so long as the gonococcus is present the clinical state is subacute, and at any time may produce an acute exacerbation just as active as the beginning of the disease. The so-called "gleet" is also an unfortunate term, denoting nothing.

In the absence of gonococci the discharge is either mucous or contains one or two of the other pyogenic bacteria. The mucous discharge has its origin in the urethral glands, either diffusely distributed or in the crypts of Morgagni, the utricle, prostate or seminal vesicles.

In the male the urethra harbors from 15 to 35 different strains of bacteria in 20% of cases. These organisms though usually non-pathogenic, may become pathogenic under various stimuli. This is significant in calling attention to the non-venereal origin of urethral discharges, a fact of importance from a physical, therapeutic and social viewpoint.

There are many factors that predispose to chronic inflammation of the urethral mucous membrane and produce a discharge. These may be classified as follows:

1. Lowered resistence subsequent to gonorrhea.
2. Uncleanliness.
3. Constipation. Intestinal stasis and accumulations of feces in the lower tract are accountable for the greater percentage of non-venereal infections of the genito-urinary tract.
4. Secondary to inflammations of—
    - Prostate and vesicles.
    - Urinary bladder.
5. Traumatic—
    - Falls and blows.
    - "Stormy coitus"; so-called "strain" which

is a transient hyperemia and disappears without any treatment.

6. Mechanical—
   - Instrumental, intraurethral masturbation.
   - Foreign bodies.
   - Brutal and careless instrumentation.
7. Chemical—
   - Chronic alcoholism.
   - Phosphaturia, seen in prostatics with residual urine.
   - Hyperacidity of the urine.
   - Concentrated irrigating solutions, usually potassium permanganate, also caused not infrequently by too intensive urethral prophylaxis.
8. Thermal—
   - Too hot irrigating fluids.

In order to properly understand the pathology of chronic urethritis it is necessary to briefly consider the morbid changes of the urethral mucous membrane following its invasion by the gonococcus.

The infection begins with the lodgment of the gonococcus in the fossa navicularis by a suction process at the time of ejaculation. It spreads by propagation of colonies in a manner similar to the growth of the organism in the test tube. The infection probably spreads by direct proliferation of the organism.

The progression that takes place is first a superficial hyperemia due to the influence of the toxins liberated, according to Warden, by the autolysis of the gonococci. The invasion may extend then in either of two ways: Along the upper layers of the mucous membrane, or to the deeper layer into the ducts of the glands of Littré, thus involving the submucous connective tissue, the cavernosa and spongiosum. The picture now becomes one of any pyogenic infection: edema, vascular changes with leucocytic emigration, necrosis and necrobiosis, with pus formation in the regular order of suppurating inflammation.

The process may now become one of retrogression influenced by leucocytosis produced either by direct stimulation from the gonococcic toxins, or aided by the influence of drugs used in instillations. The gland ducts remain patent, drain spontaneously, the edema and hyperemia gradually disappear, complete resolution taking place.

On the other hand when the opposite occurs the ducts become infiltrated, "their mouths are glued over," thus harboring the gonococci, which may continue their activity and produce miliary abscesses or large abscesses which rupture either into the cavity of the urethra or externally, producing fistula.

Among other lesions that occur are small superficial erosions or ulcers that may develop at any site along the urethral mucosa. Fissures usually follow the crypts of Morgagni and may be very deep. The formation of granulations is one of the common processes in prolonged attacks; these may be discrete or diffuse and vary greatly in number. They are of two varieties; the soft type which bleed easily, and the infiltrating type, probably representing a more advanced change. These latter extend more deeply and if numerous undergo a subsequent metaplasia, producing a narrowing of the lumen of the urethra or formation of a stricture.

The staphylococcus may invade the glands of Littré and produce a marked infiltration of the crypts, subsequently causing a stricture of the resilient variety. This organism and the colon bacillus do not often penetrate the deeper structures to produce a peri-urethritis.

The pathologic changes of the verumontanum as described by Rytina are, "a submucous and periacinus infiltration of round cells. The infection travels down the length of the sinus pocularis into the invagination below, showing the necessity of injecting the canal, as first suggested by Luys and later by Geraghty. Involvement of the sinus no doubt is a most important factor in perpetuating or rekindling urethral discharges."

Changes in the seminal vesicles undoubtedly are incidental in keeping up or at least in contributing toward a chronic inflammation of the urethra.

There may be no subjective symptoms, on the other hand the patients complain of some pain, usually in the region of the bulb; perineal discomfort, itching, and painful priapism are often present. If the pathology involves the veru or prostatic urethra there is frequency of urination.

Objectively we have to consider the discharge and the urine. The former may be only the morning mucous "drop," it may be sero-purulent or purulent. Any of these types of discharge may characterize the post-gonorrhoeal urethritis.

The urine in chronic urethritis which results from gonorrhea is usually clear with either "pus" or "mucus" shreds present, dependent upon the degree of epithelial exfoliation in process.

The non-specific bacteria may be found on direct smear. The urine may be turbid if the bacteriuria is very pronounced. Blood in the urine is a terminal occurrence and represents probably the squeezing out of some red cells from the granulations. A severe hematuria is rarely associated with chronic urethritis.

The importance of diagnosis lies in the recognition of the cause of the existing or persisting discharge by localizing the pathology on the one hand, and determining the etiologic factor on the other. The history is of value; the examination of the discharge is, of course, most important, but it is often absolutely impossible to make an accurate diagnosis from "smears" alone. Cultures must be made, without this accurate diagnosis no rational therapy can be instituted.

For localization of the active lesion the urethra must be explored by the endoscope and the cysto-urethroscope. No physician is competent to treat these cases without the ability to manipulate these instruments. Finally, digital palpation per rectum and examination of the expressed discharge from vesicle and prostate will complete the exploration of the foci which may be producing the continued discharge.

Chronic urethritis must be differentiated from urethrorrhea and prostatorrhea.

There is a wide range of opinion as to the length of time the gonococcus may persist in the male genito-urinary tract. E. L. Keyes, Jr., states that he has "never known the gonococcus to persist in the male urethra for more than three years, while in at least 90% of cases it disappears with or without treatment within a year." It is, of course absolutely impossible to know in each case exactly when the individual ceases to harbor the gonococcus but if the following rules are observed it will be very rare indeed that error will occur.

If the infection was limited to the anterior urethra, one year must have elapsed from the time of the last evidence of the infection before consent is given for marriage. If the infection extended into the posterior urethra, thereby involving prostate and vesicles, then two years must elapse after the final clinical disappearance of the disease.

A primary non-gonorrheal urethritis does not often become chronic, but may be due to the influence of one or more of the pyogenic bacteria gaining entrance to the urethra through its lowered resistance following a gonorrheal infection. The bacillus coli, and staphylococci in combination are more resistent to treatment. They may be exterminated and the mucous discharge may still persist, until the lesion producing it is localized. Finally it must be admitted that there are some cases, fortunately in the minority, in which, despite every rational means of therapy, the "morning drop" will persist. If no pathology is determinable and the urine shows only mucous shreds, the patient should be frankly told that he can never be freed from the condition, but that no harm can ever result from it, either to himself or to a prospective wife. This statement is made with the reservation that the points mentioned are taken into account.

In considering the treatment the patients should be divided into three groups; (1) those in whom the urethral affection is a simple diffuse chronic hyperemia, with slight epithelial exfoliation, manifested by shreds in the urine; (2) those, who, upon urethroscopic examination show localized lesions along the urethra such as fissures, ulcers, granulations, etc.; utriculitis and verumontanitis; (3) those in whom the prostate or seminal vesicles or both are the offenders.

For the first group, the passage of sounds followed by instillations of silver nitrate ¼% to 1% and massage of the urethra, is the program to be carried out.

Any of the localized lesions in the second group should be touched with silver per endoscope; beginning with 10% and increasing to 25% or even the pure stick made into small molds for this purpose and carried by the Young porte caustique. For gaping Littré glands and for any involvement of the utricle, direct injections 1% to 3% silver are made with the Geraghty syringe.

For the third group, systematic stripping of the vesicles and massage of the prostate should be carried out. This can be followed by deep instillations or irrigations, but in the writer's opinion these procedures have little value, but in these cases can do no harm. When after a reasonable length of time conservative measures fail, vasotomy should be performed. In my experience in approximately 75% of the cases satisfactory results are obtained. Vesiculotomy is condemned as a difficult and serious operation and not productive of any results.

If the discharge shows an admixture of either colon bacillus or the staphylococcus, for the former organism ½% solution of aluminum acetate gradually increased to 2% upon tolerance is effective. For the other organism 1:5000 solution of mercury oxycyanide is almost specific therapy.

31 North State Street.

Cystitis in the Female.

Continuous irrigation of the female bladder with sterile water by means of a two-way catheter is a simple and harmless procedure and is of great value in certain cases of severe ulcerative cystitis. —Alfred P. Jones in the *Virginia Medical Monthly*.

URETHRAL ABSCESS.

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From the standpoint of the canal as the source of infection urethral abscess includes the involvement of all glands; mucous follicles, Cowper's and the prostate gland. The length of this paper permits only a survey and not a detailed discussion proper for each of these complications.

The practical are the most important points and naturally involve pathology, diagnosis and treatment as preëminent because the other clinical facts are sufficiently familiar to be omitted. In gonococcal and non-gonococcal urethritis all glandular infection occurs without or with occlusion of the duct. Patent ducts provide drainage and constitute in the large glands follicular inflammations, very important in the prostate but not within the meaning of the title. Closed ducts cause parenchymatous disease or abscess whose size is a mere detail. The process in essence, involvement, temporary, permanent, associated and complicating lesions is identical in kind though widely different in degree. In this symposium the gonococcal forms are the types which all others copy except tuberculosis and syphilis, which must also be omitted. The distinguishing factors between gonococcal and non-gonococcal forms are basically the organisms and their products in the tissues.

Elsewhere[1] these processes are detailed for each glandule and gland. The chief elements to remember are the continuity of the mucosa of the urethra with the gland cavities and the identity of the pathological processes thereon and progress therein, whether they be in the urethra or the glandules and glands. The gross regions may be disregarded for brevity; but the microscopy is important because it reveals how closure of ducts occurs. What appears in the mucous follicles is duplicated in the larger glands and is the following pathogenesis. A migration of the gonococcus with its penetrating destruction occurs. Pus-slugs appear through thickening of the lining and wall, then closure and enlargement to shotlike masses along the urethra. Extension means involvement of surrounding tissues and finally rupture into the urethra unless intervention provides otherwise. Occasionally the rupture occurs on the skin. Termination is destruction of function and often of anatomy. Chronic catarrhal inflammation with or without persistence of gonococci is not uncommon and pus-bearing and urine-bearing fistulæ upon the skin are occasional. In Cowper's gland these processes are simply extended, and sequels duplicated. In the prostate the process still further extends. "In termination the phlegmon evacuates according to its site and the periprostatic infection: (1) internally into the urethra, bladder, vesico-rectal space, rectum and peritoneum, and (2) externally, usually upon the skin of the perineum. The complicating lesions of prostatic abscess are due to penetration into or association in the periprostatic spaces of the initial infection, with burrowing of the pus determined largely by the original sites: (1) backward into the rectum by abscesses originally near its cavity; (2) downward into the perineum, sheath of the penis or scrotum; (3) laterally into the ischiorectal fossae and thigh, and (4) upward upon the loins and back. Pockets, sinuses and seminal, urinary or fecal fistulæ are often the sequels of such complications."[2]

The diagnosis rests on the subjective symptoms partially, but on the objective signs almost totally. It must not be forgotten that some patients for a shorter or longer time show absorption especially when the glands of Cowper or the prostate gland are concerned. Abscess of the prostate has often been mistaken for typhoid fever because rectal and urethral examination were omitted. In all these complications the local subjective manifestations are varied only by the activity of the process and include "(1) sensory: pain and weight in the perineum, rectum and bladder in the deep pelvis or referred down the thighs and into the loins much as uterine pain in the female, and (2) vesical: dysuria, pollakiuria, tenesmus through congestion and irritation, and retention of urine by edema or spasm; (3) sexual: chordee and painful, bloody, seminal emission, and (4) rectal: pain in defecation, altered stools and obstipation, through mechanical pressure and tenesmus through reflex action or periprostatic invasion."[3]

The objective findings are urinary and rectal. The urinary signs are pus in all test glasses, slugs, detritus and blood occurring with prostatic disease. The writer's seven glass test should be omitted unless the case is quite mild and not recent. Those who are not familiar with it should never use it until they have acquired the necessary dexterity and judgment with chronic lesions. This test belongs to subacute and chronic conditions. The rectal signs include the perineum and show the abscess at one or more points or in one or more lobes of the prostate or in the whole gland. Likewise Cowper's gland or glands present in the perineal body on bimanual examination as abscesses of common characteristics attached to or in relation with the urethra. The mucus follicles may be single or multiple and scattered along the canal like shot discernible without or with a soft rubber catheter passed to the bulb. The signs of abscess are further fever, prostration, depression, nausea, vomiting, white cell count, sometimes bacteremia and occasionally the positive complement fixation test. If the abscess has ruptured, then the path of the fistula is apparent through urethroscopy and the use of probes, filiforms and dye injections. The differential diagnosis chiefly concerns organisms other than the gonococcus and the exclusion of abscess in other parts of the body and other diseases notably typhoid fever. The Widal reaction, the typhoid bacilli in blood, excreta and urine together with the presence of the urethritis and its complications makes such a diagnosis almost inexcusable, if it were not for the fact that lower grades of prostatitis may not cause much local disturbance. The patient goes to bed sick, hides his venereal disease and deceives the physician for a short time.

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[1] A text-book of Urology in Men, Women and Children. Pedersen, 1919.

[2] Pedersen, *loc. cit.* p. 117.

[3] Pedersen, *loc. cit.* p. 118.

The treatment varies with the complication. Prophylaxis consists in the thorough diagnosis of the type and tendencies of any urethritis. One that is seen to extend itself rapidly along the urethra and show subjective symptoms while still a urethritis proves an aptitude toward complications and requires the utmost conservatism. Rest in bed at the first appearance of sympathetic congestion of the prostate is in order, if possible without betrayal of the patient. Local measures in home or office should be abandoned, a suspensory worn and disturbances through errors in exercise, food, drink, indirect and direct sexual excitement avoided. The decongesting influence of hot hydrotherapy and of phototherapy to the limit of mild burn (without blisters) of the gluteal and posterior thigh regions are valuable. Other physical measures such as massage and electrotherapy belong to a later period, except in very skilled hands. The writer had a patient with acute gonococcal prostatitis in whom he dispelled the gonococci in three weeks without extension to the vesicles or testicles by means of the insulated vacuum rectal electrode attached to the negative pole of the static machine, with the positive pole grounded, for twenty to thirty minutes every other day. The significance of this case lies in the fact of severe infection fully controlled by a relatively unfamiliar method without extending the disease or disturbing the patient for even one day of ordinary life. The failure of the case as a complete cure is resident only in the man's stupid neglect of continued treatment for perhaps another three weeks. He himself really lost the opportunity of short and probably complete relief of a severe follicular prostatitis without added complications, or extension into abscess.

In the operative treatment the writer believes that he has demonstrated the efficiency of the following procedures. A follicular abscess at the meatus must be opened into the urethra. Removal of the urethral wall of the abscess through a V-shaped flap with its base at the meatus is very important because the cavity then cannot recur and must granulate. Follicular abscess along the canal should not be opened into the urethra, but very freely indeed through the skin exactly as is done with Cowper's gland. The writer usually makes this skin incision three times the diameter of the abscess so that the skin cannot possibly close before the cavity fills with granulation. While operating the cavity is wiped with gauze and never curetted, for fear of opening into the urethra. For the same reason applications such as iodine are not employed.

The writer is convinced that any operation which opens a prostatic abscess into the cavity of the urethra is a serious mistake because the only result thereof must be blind pouch or sinus or fistula in which urine accumulates and decomposes. Too many such cases are encountered through systematic urethroscopy to make any other opinion possible. "The technic of operation is simple for cases with pus present to the examining finger by the enlargement, tension or fluctuation, or with pus indicated by severe absorption closely simulating typhoid fever, with which they are sometimes confounded during the first few days. Equipment is the same as in external urethrotomy with a guide, and the preparation of the patient is that usual for any major operation and of the field by any recognized method, of which none is better than tincture of iodin, provided the scrotum is not thickly coated. Anesthesia is by choice general on account of the uncertainties of the deep dissection, but may be spinal in occasional cases, and rarely local because the inflammation makes the instillation so painful. Posture is exaggerated lithotomy and general landmarks are the rectum behind, base of scrotum in front with its raphé, the tuberosities of the ischia and the urethra made prominent by the author's irrigating sound. The incision should leave the urethra intact and be made over the prominence of the swelling in unilateral cases and over each swelling in bilateral, discrete cases, exactly as in bilateral cowperitis and over the abscess as a whole in bilateral confluent cases. Its form may be straight and oblique, horizontal or curvilinear, as in perineal prostatectomy. The horizontal incision is to be preferred when possible because it most conserves the muscular structures of the perineum, gapes longest for drainage and is in general parallel with the prostatic ducts. The superficial field is the perineal skin, fat and fascia and avoids the muscles as far as possible by blunt dissection to the lower surface of the gland, which is the deep field. If pus is not apparent to the finger an aspirating needle will locate it, upon which as a guide the straight blade sharp point bistoury is entered and the prostate divided to the limit of the skin incision. The finger in the wound now explores the cavity of the gland for other foci and gently breaks them into the main pocket. The rounded tip of a velvet eye catheter is passed into the wound for irrigation and stitched to the skin for drainage combined with one or more cigarette drains which with external dressing and a good T-binder still all hemorrhage. No suture of the wound should be necessary. If no pus is located free incision is warranted as a relief of hyperemia and absorption. Pus will appear in such a wound quite regularly after a day or two.

"The disapproved methods are puncture of the abscess, with trocar and cannula, through either the perineum or the rectum, because neither route nor instrument gives adequate drainage, and the rectum becomes infected with gonococcus and the abscess, with the flora of the bowel, notably the bacillus coli-communis."[4]

The immediate after-treatment respects toilet of the cavity of the abscesses and if the bladder is involved the toilet of that viscus also. Drainage with gauze and tube with suitable dressing vary with the site and size of the cavities. Remote aftercare continues the said dressings, removes the tube and decreases the gauze drainings according to indications and prevents premature closure of the skin before the cavity has granulated. Resumption of treatment of the antecedent urethritis follows only after danger of tearing into the abscess cavity is over through sufficient granulation. Caution and conservative judgment require the urethra to be left alone by all except experienced hands. Intrinsically all these cases belong to the hospital and office service of the specialists.

In these days the social service side of venereal disease is fully as important as the professional service to the patient, because the former aims to prevent infection of the innocent outside or inside of wedlock. Such social service belongs alike to hospital and private practice and its meaning warrants the following quotation from the work already named (p. 126) and may be applied to all three lesions under discussion.

"Cure is not possible for entire restitution in the pathological sense, but relief from all symptoms and restoration to nearly normal physiology is usual in the symptomatic aspect. Return of the urethral mucosa to absolute normal probably rarely occurs. Perhaps most important of all is relief from infectiousness in both the follicular and the parenchymatous forms, thus constituting bacteriological cure—a most important sociologic matter, because the prostate is copiously and directly related with the production of semen."

It is regretted that three cognate yet highly different conditions were required by the title assigned; but it is hoped that the aim of making the practical point emphatic has been successful.

45 West Ninth Street.

ON THE STRICTURES OF THE MALE URETHRA.

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Anatomy.—The male urethra consists embryologically of two parts, a posterior segment beginning at the bladder and ending at the ejaculatory ducts, and an anterior segment which comprehends the remainder of the canal. Considering the regions of the body in which it lies the urethra can be divided into pelvic, perineal and penile portions. In relation to strictures it is better to consider the urethra as of prostatic, membranous and spongy portions. An abnormal narrowness of any portion of the canal of the urethra constitutes a stricture. Indeed, a simple hardening of the musoca of the urethra is capable of forming a stricture. The urethra is not a simple canal to let the urine pass, but it acts like a valve, which with its muscular layers squeezes out the urine to the last drop. When the mucous membrane has been hardened and changed in its delicate structure, if yet there is no organic narrowing of the organ, yet the hardened mucosa prevents the last drop of urine from coming out, one or two drops of urine remain beyond the hardened mucosa and maintains a constant irritation which constitutes the so-called gleet.

The urethra has not the same calibre all the way through. The meatus, the middle of the pars pendula and the beginning of the pars membranosa are naturally somewhat narrower. Other parts of the urethra are enlarged, so after the meatus the fossa navicularis is much larger, before the pars membranosa is another enlargement forming the bulbar urethra, while the prostatic portion is an enlargement in the shape of a triangle. At this point the ejacualtory ducts and the prostatic ducts open, and from this point infectious materials reach those organs. The pars membranacea runs from the prostatic portion to the bulb going through both layers of the triangular ligament, surrounded by the fibers of the compressor urethrae muscle. Behind it the glands of Cowper lie, the excretory ducts of which open at this point in a narrow space the least distensible of all parts of the urethra. This is just in the curve, less movable because it is firmly fixed to the symphysis. On account of its curve the anterior wall of the mucosa is shorter than the posterior.

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[4] Pedersen, *loc. cit.* p. 125.

The wall of the urethra is formed by a mucous membrane containing a rich venous plexus, and in the prostatic and membranous tract it is well clothed with muscular tissue. The mucous membrane has an epithelium which varies in the different parts of the urethra. The proximal two-thirds of the prostatic portion resembles the epithelium of the bladder. At the pars membranacea the epithelium takes the aspect of the columnar type. This epithelium covers the rest of the urethra to the fossa navicularis where it is changed into stratified epithelium. The meatus is the continuation of the epidermis covering the glans.

The muscular fibers are some striated and some non-striated. The non-striated, involuntary, are incorporated in the wall of the urethra, while the others are in the form of accessory bundles derived from structures surrounding the urethra. Some of the intrinsic muscles are longitudinal, forming the first coat, and some are transverse or circular. The circular fibers, well developed, form a thick layer especially towards the internal orifice. The removal of all urine at the end of micturition is due to the action of the muscular tunic.

Varieties.—Stricture may be spasmodic, the result of the contraction of the compressor urethrae, which may impede temporarily the passage of the urine from the bladder. Keyes[1] refers to this condition—the abnormal urination in nervous individuals, who cannot urinate in the presence of others. After an operation for hemorrhoids in some individuals the urination becomes difficult and spasmodic. This kind of stricture is not permanent, being only of spasmodic nature, yet it must be relieved to avoid disastrous consequences in the urinary organs. In these strictures the use of the filiform bougies will increase the irritation while a good size catheter will be easily passed and will tire the spasm of the muscle. In withdrawing the instrument no grasping is found. Sometimes, however, a spasmodic stricture coexists with an organic one and the spasmodic stricture may be the result of the other.

The spasm is easily overcome by the use of hot sitz bath, by the administration of opiates, and later by the insertion of a metallic sound. To prevent recurrence the passage has to be dilated, the muscle stretched, and in order to diminish the sensitiveness, the instillation of a few drops of a solution of silver nitrate 1 to 1000 will be of a great value.

The strictures which we shall consider here are the sequel of urethritis. They consist in a contracting periurethral formation of fibrous tissue, after the reabsorbtion of the infiltrating elements deposited in the submucous layer during the inflammatory process. The mucous membrane becomes hard, thickened in some places; the lumen of the urethra is not narrowed, but yet the function of urination is impaired. This can be considered the first stage of the stricture. When, however, the process of infiltration in the submucous tissues heals, on account of the sclerotic changes in the connective tissues, it forms a scar, which retracting the tissues causes the narrowing of the lumen of the urethra. Consequently there are two kinds of strictures; the first soft, easily yielding, which rarely affects the dimension of the urethra, have been called after Otis *wide caliber strictures;* the second kind formed by hard retracting tissue have a tendency to narrow the caliber and are known as organic strictures.

It is a difficult task to state when the large caliber stricture begins and when it ends, but it is true that the large caliber stricture is the beginning and the callous stricture the end. A stricture can be formed in any part of the urethra, but some parts are more subject to the strictures than others. Thompson reported 320 cases of strictures of the urethra of which 54 were seated in the beginning of the urethra from the orifice to two and one-half inches of the pars pendula; 51 were in the middle of the pars pendula; 216 were found in the subpubic curvature in the bulb and in the membranous urethra. The frequency of strictures in these regions is due to the fact that they are exceptionally vascular, and on account of the curve the chronic urethritis is apt to localize at those points. The abundance of follicles in the bulbar region favors submucous exudation. Traumatic stricture is found more often in the membranous urethra.

A stricture may be formed in ten or twelve months after the apparent cure of urethritis, while others are noticed a period of years afterwards.

Etiology. Strictures may be produced by trauma or by gonorrhea. According to Thompson and Martin those from gonorrhea are much more frequent than the others. As a result of urethral chancre and from ulcerated gummata we have seen deformities of the meatus and cicatricial formations of the fossa navicularis, but it seems that stricture of the urethra proper are chiefly the consequence of a gonorrheal process.

A stricture may be alone, but not rarely do we find more than one stricture in the same urethra. Although Thompson in his statistics amongst 270 cases of strictures has found only 44 cases of multiple stricture, yet Guyon has established as a rule, that strictures of gonorrheal origin are multiple, while those of traumatic origin are single. In our experience with strictures of gonorrheal origin we have found only rarely two at a distance from each other in different portions of the urethra. In some cases a gonorrheal stricture may present a number of ridges to the exploring bougie and so give the sensation of multiple strictures while pathologically it is one.

Gonorrheal strictures are much more frequent than traumatic. Thompson placed them at 75 per cent., Martin at 85 per cent. Gonorrhea itself is sufficient to produce stricture and this is the cause in most of the cases. In some cases, however, the stricture may have been caused by gonorrhea and trauma together as in the injuries of the urethra resulting from the superstitious suggestions of breaking the chordee, or from caustic injections, or from the injudicious use of instruments.

Traumatic strictures have been found to be the result of a fall on the perineum. Prezzer[2] referred to the observations of Millee of seven cases of urethritis caused by riding on the bicycle, and two cases of ruptures of the urethra followed by stricture. In individuals who have practised masturbation stricture has been found, being the result of tearing of the mucous membrane in the spasm of the pernicious act.

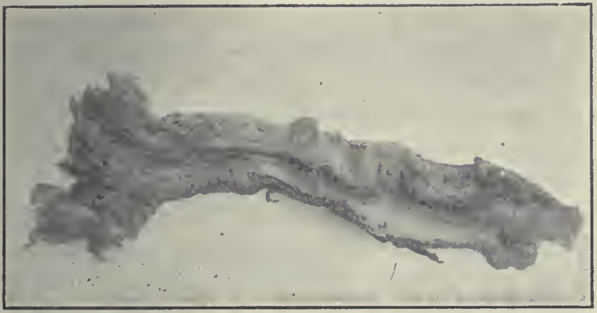
Pathogenesis. It is easy to understand how a stricture is formed in a portion of the urethra, by remembering the changes, which the conjunctiva undergoes in a case of gonorrheal ophthalmia. The gonococci after producing acute urethritis, have an inclination to enter the epithelial cells, and, going through them, find shelter in the deep epithelial layer towards the connective tissues. Usually they limit their action in limited portions of the urethra, where they are less disturbed, as in the glands, lacunae Morgagni, in the places where the walls of the urethra are closer together as at the beginning of the bulbar region. A chronic inflammatory process results with an infiltration, which, together with the irritation of the connective tissues of the subepithelial layer, starts the papillary proliferation. At this point by means of the urethroscope the mucous membrane appears dark red, granulated, it is somewhat thicker, hard and inelastic. This is the beginning of a wide-caliber stricture. In some cases in the spongious tissues a kind of inflammatory knot is formed, very painful, hard to the touch. This usually does not form an abscess, but is reabsorbed. When the infiltration disappears the affected trabeculae of the spongious tissue shrink. Their connective tissues, hardened, undergo a sclerotic process. This causes atrophy of the spongious body with narrowing of the lumen of the urethra, and formation of the stricture.

It is not always an acute process which causes infiltration of the trabeculae of the spongious tissue, but more often a chronic inflammatory process is equally responsible for the induration and the infiltration of the spongious tissue of the urethra. This process which can be diffused through a great tract of the urethra is usually limited to a small portion. (See illustration). The process consists in the increase of the connective tissues of the trabeculae, which makes the alveoli much smaller, and the delicate spongious tissue is converted into a hard and thick degenerated sclerotic tissues.

The work of Vajda, Neilsen, Baraban, Finger, Wassermann, Nadli and Guyon have contributed a great deal to clearing up the pathology of strictures. It seems that the anatomico-pathological process is the same throughout, which from the chronic urethritis gradually brings about the stricture. In the urethritis we find an inflammatory process, which is localized in spots, affecting the epithelial and the subepithelial tissues. In the beginning the acute stage produces infiltration of serum and of small white cells, which infiltrating the connective tissues causes their proliferation and so their thickening and swelling. Gradually the infiltrating cells are reabsorbed, spindle cells go on forming connective tissue bundles, which are changed into a thick succulent superficial cicatrix covered with an abnormal epithelium. When these alterations have diminished the elasticity of the urethra in its deeper layer, and when the cicatricial formation has extended to the corpus spongiosum, then the portion of the urethra loses its elasticity, its normal caliber is narrowed and the organic stricture has formed.

Of course that portion of hardened mucosa retains a few drops of urine which remaining behind the impediment irritate the mucosa and maintain a certain degree of irritation. Guiard[3] thought that the virulence of the urethritis was the cause of the production of the stricture. We have often found strictures following cases of urethritis, which on account of their mildness had been neglected.

The strictures have been described as linear, annular, irregular, tortuous, etc., which are only clinical distinctions to indicate the quantity, the shape, the disposition of the scar tissue, which at times forms a thin band and at other times an irregular mass.



A stricture, post-mortem, appears yellowish-white in color, hard and fibrous in consistency, of different sizes and shapes. It has no hyperemia, swelling or infiltration when seen through the urethroscope during life. The epithelium is thickened, whitish and resembles a superficial cicatrix. The subepithelial tissue when the swelling is gone does not show much change, microscopically, but in some cases the surface is ridged, uneven and even nodular. When the stricture has been much advanced a band of cicatrix replaces the mucous membrane, penetrating into the corpus spongiosum. Behind the stricture the canal of the urethra is distended, abraded and superficially eroded.

Microscopic examination shows the epithelium thickened, its cylindrical cells in condition of mucoid degeneration. Pus cells are found imbedded between the layers of the epithelium (Finger[4]). The thin cylindrical epithelial cells are converted into a hard thick pavement-like epithelium. The change of the cylindrical into plaster epithelium is of itself a cause of necrosis of the mucous membrane, which is connected with the alteration of the subepithelial connective tissues.

In recent cases the infiltration surrounds the lacunae and the glands, which imbedded in the subepithelial tissue, after a while become atrophic and disappear. In many cases the inflammatory process remains superficial and produces only a superficial non-constricting cicatrix. In other cases the process is deep, affects the periurethral tissues as far as the corpus cavernosum and forms a thick retracting stricture, as a result of cavernitis complicating the chronic urethritis.

There is a great difference in the amount of retraction between strictures of large caliber and those narrowing the canal. In the first a superficial thickening of the mucosa and the superficial layer is formed, which deprives the portion of the organ of its elasticity and retains a few drops of urine, maintaining a constant irritation. The others, thick, hard, deeply contracted, will scarcely admit a slender sound.

Symptomatology. The symptoms from which we ascertain the presence of the stricture in the urethra are some suggestive, some subjective and some objective or physical.

A long-standing gleet will suggest the presence of a stricture. The patient in the morning squeezes out of the meatus a little drop of clear or milky or even creamy fluid. In some cases the fluid is scarcely perceptible, becomes dry and sticks the lips of the meatus together. In many cases of stricture the gleety discharge is missing.

Whether a gleety discharge accompanies the stricture or not, the urine shows the presence of shreds. These are small, short, or like a light cloudiness, while at other times they are heavy, thick, twisted and soon sink to the bottom. On account of the increased acidity of the urine, the stricture is irritated and contracts, then the sypmtoms of posterior urethrtis grows worse, and the urine becomes cloudy. These exacerbations are considered by the patients as new attacks of gonorrhea.

At this point the patients suffer from what is called irritable bladder, with the necessity of urinating frequently (Hirsch[5]). It is not the nervous bladder but a catarrhal inflammation extending from the posterior urethra to the neck of the bladder, which causes the necessity to urinate, when it is touched or slightly distended by the urine. The frequency of urination varies, and it is felt especially at night, compelling the patient to get up several times to empty the bladder.

The presence of urine in the bladder, on account of the irritability of the genital organs, causes frequent erections at night, which, although not accompanied with loss of semen are troublesome to the patient. In some cases the patients have frequent loss of semen. At times the erections are painful, the stricture prevents the discharge of semen in the sexual act, which either dribbles out of the urethra or runs back into the bladder and is discharged with the flow of urine. In many cases of stricture the patients complain of diminution of the sexual appetite and some of impotence.

Subjective Symptoms—A stricture in the urethra impeding micturition causes change in the stream either during the whole urination, or at the beginning or at the end. The size of the stream may be reduced sometimes to a mere thread. Often the stream is divided into two, spurting in different directions, at times it is tortuous or twisted. The projection of the stream, which is the result of the intensity of the contraction of the detrusor vesicae is greatly impaired, and the last drops which remain behind the stricture dribble out without any force of expulsion. In some cases the urine begins to flow, then stops and the urination is finished at intervals. Painful micturition as a consequence of stricture is rare, and exists only when cystitis or prostatitis has developed, or when the urethra on account of inflammation is sensitive to distension. When the posterior urethra is inflamed pain is felt in the beginning of the urination and at the end, when the last drops are expelled.

When the bladder, still normal, cannot empty on account of the strictured urethra, this may cause spasmodic pains. The pain from the bladder radiates towards the rectum and the urethra. Only in rare cases the stricture may lead to retention of urine. It is the result of an engorgement of the peristrictural tissues, which arrest the normal emission of the urine. According to Valentine[6] this condition is precipitated by alcoholic or by sexual debauch.

It has to be remembered that on account of the continuous straining to urinate, the patients are subject to hemorrhoids and also to rectal prolapse.

In severe cases of stricture the bladder undergoes a process of inflammation not only catarrhal, but parenchymatous in character. The ureters and kidneys are also badly affected by the continuous pressure, and may be involved in a form of pyelonephritis. The presence of the urine back of the stricture forms a dilatation, which may let the urine infiltrate causing extravasation, perineal abscesses, and urinary fistula.

In many cases the stricture of the urethra is responsible for sexual neurasthenia, pruritus of the perineum and rectum, persistent and recurrent herpes progentalis, and even dyspepsia and pains in the stomach.

Objective symptoms are all positive signs which we obtain by means of instruments. It has to be remembered that when discharge is present, it has to be examined microscopically. If there are gonococci in the secretion it is dangerous to introduce instruments. In this case it is better to have the patient treated by the irrigation method.

When no more gonococci are present or no more secretion and the patient shows irregularity in urination, in order to ascertain the presence of the stricture and its location, we introduce a blunt steel sound. The first time we use a sound which easily enters the meatus (10 or 12 American) which, after having been sterilized and well lubricated is introduced with great gentleness.

In some cases the sound is introduced without encountering any obstruction until the bladder is reached, but when the instrument is withdrawn it is grasped so that it can only with difficulty be taken out. This symptom shows the presence of a wide caliber stricture. Before concluding that there is a stricture, the possibility of urethral spasm has to be eliminated. In some cases the irritation from the presence of the sound provokes a reflex action of the muscles of the urethra which, contracting, grasp the instrument. This constriction, however, is never so firm and permanent as an organic stricture. Furthermore, when the constriction is the result of the stricture a discharge of one drop of mucous milky secretion follows the withdrawal of the sound. This drop of secretion is of urine, mucous, saline particles of the urine, which had remained behind the strictured point, and when the sound has distended the stricture it finds its way out of the canal.

In some cases, in order to ascertain the presence of a wide-caliber stricture, it is better to use an olive-shaped bougie, as recommended by Pousson[7], Jurquet[8], and Valentine[9]. The olive-shaped bougie is easily introduced, but when withdrawn it is grasped firmly by the strictured portion of the urethra. In other cases, when the stricture has already impaired the lumen of the canal an obstruction if encountered which prevents the introduction of the sound. Then it is necessary to try smaller blunt sounds until it is found possible to pass the stricture.

When the presence of a stricture has been ascertained it can be easily located in the different portions of the urethra, and can also be measured by means of olivary bougies, or by the urethrometer of Otis. In reference to this instrument Lovenhardt[10] and Stewart[11] caution the surgeon that it is dangerous and questionable practical utility.

Prognosis. In a general way we may state that strictures of the urethra do not occur as often as is commonly believed. Jurquet in 1,420 patients with diseases of the genito-urinary tract found 133 cases of strictures of the urethra of which 25 were of large caliber. From our own experience we can assert that the incidence of strictures has greatly diminished. The active propaganda on social hygiene, the exact knowledge of the cause of gonorrhea, and the judicious and rational treatment at the reach of every practitioner have had a great influence in this diminisition. Von Sehlen[12] wrote that the formation of a stricture is scarcely possible when a well directed treatment for gonorrhea is applied. To this has to be added, when the patient applies early to the physician, and when the physician has thorough knowledge of the treatment.

In reference to the stricture itself we can say that the prognosis depends upon the nature and the location. Traumatic strictures have a tendency to contract rapidly, while gonorrheal strictures have slow course. Strictures of the perineal urethra are more difficult to treat than those of the pars pendula. When a stricture is extensive and deep, having its base in the cavernous tissues it will never be completely cured. It will be relieved by the use of sounds or by operation, but it will gradually relapse.

As to danger to life, it has only rarely occurred that a stricture has caused death. In rare cases death has been the result of extravasation of urine, followed by abscess and gangrene. In other cases death has been produced by chronic uremia, when the kidneys have been involved in an inflammatory process. In other cases death may be the result of cachexia and exhaustion from pain and from the torments caused by an old impassable stricture. The patients lose sleep, fail to eat from the unrelieved desire to urinate, and from the fatigue and the labor of difficult urination.

Treatment. The treatment of urethral strictures has for its aim to enlarge the lumen of the urethra and maintain its enlarged caliber by dilatation.

Dilatation is effected gradually and gently by the use of sounds, which massaging the scar tissue of the stricture provoke its absorption. Keyes stated that the maximum of effect is produced by the minimum of effort, which coincides with the opinion of Guyon, that the effect is due not to the pressure of the sound, but to its mere contact. Passing a sound by force, will tear and bruise the mucous membrane and consequently increase the inflammatory reaction. A steel sound must go in without effort. In this way the presence of the sound will be able to lessen the congestion at the point of contact, correct the irregularities in the canal and stimulate the deeper tissues to a reaction so as to soften the cicatrix. In our practice we have entirely abandoned the method of forced dilatation and of divulsion, which some years ago were largely applied with serious consequences.

When the stricture is yet soft or in a semifibrous stage, it can be easily removed by prompting the reabsorbtion of the infilerated elements by means of gradual dilatation.

The dilator of Oberlander marked a great progress in the therapeutics of strictures. It was found however that the two blade dilator was not sufficient. Kollman has given us his admirable dilator, which consists of four blades which open in opposite directions. The instrument when closed is not larger than an ordinary sound 22 Charrière. It is introduced in almost any urethra without the necessity of meatotomy. We have used the dilator quite often for many years, but gradually we are using it less frequently, relying mostly on the use of steel sounds.

In cases of hard, cicatricial strictures it is not easy to enter with dilators. Some of these small caliber strictures scarcely admit a sound less than 15 French, others admit only a filiform bougie. The treatment begins with small soft rubber bougies; steel sounds have to be avoided because of the danger of producing false passages. In the treatment of these strictures we have found beneficial the application of electrolysis, for with it we have accomplished in one sitting, that which we could have obtained only in weeks treatment. Mansell Moullin[13] claims that in a narrow cicatricial stricture a current of 10 to 15 milliampères has made the scar soft, and the tissues capable of distension. The action of the weak currents produces a serous exudation, and a real decomposition of the fibrous tissues removing the hydrogen with the kathode. Strong currents have to be avoided as they cause cauterization of the tissues. For ordinary work a current of from 10 to 20 M. A. is sufficient. The electrolytic sound is kept at the place of the stricture, pushing it gradually and gently forwards. After a short time it is noticed that it advances and the stricture is passed. When the sound has passed the stricture, it is left from three to five minutes, then is withdrawn. The pain accompanying this operation is so insignificant that there is no necessity of local anesthesia. The reaction is somewhat more than that which follows the introduction of an ordinary sound. The softening of the stricture is only temporary, and the use of steel sounds has to be continued to insure a permanent cure.

Levin[14] proposes short radium applications through the urethra as an adjuvant to instrumental dilatation. But a beneficial effect is denied by

Ayres[15], who in two hard strictures used a capsule of 40 mm. left in situ for thirty minutes. In one case retention developed and in the other acute urethritis. In both cases the strictures were harder than before. In obstinate and recurring strictures it is necessary to resort to urethrotomy. Internal urethrotomy in the perineal portion of the urethra is done with the dilatation urethrotome of Otis or of Maisonneuve. The cutting of the stricture is not free of any danger, as sometimes there may be hemorrhage. The benefit is temporary; after a while the tissues shrink again and the stricture needs to be dilated.

In some cases of impassable stricture external urethrotomy by perineal section is the only means to relieve the patient. We have had occasion to perform this operation, many times, with beneficial results.

When by any method the dilatation of the stricture has been obtained the second interesting part of the treatment is to keep the stricture dilated and finish the treatment. For this purpose the passing of sounds with Benequé-Guyon curve, leaving each in for three to five minutes answers the purpose. In a general way we can state, that when a stricture of the urethra has been dilated to a caliber of 25 to 30 French it can be considered a good result.

During the treatment of a stricture complications may arise which we shall only mention, epididymitis, inflammation of the stricture, and the so-called urethral fever. The use of internal urinary antiseptics such as salol, formaldehyde ammoniate, known as cystogen, antiseptin or uretropin, will clear the urine and will prevent septic fever. Before and after the dilatation an irrigation with a mild solution of biborate of sodium or of permanganate of potassium will diminish the danger of epididymitis.

The last remedy to save trouble is the hands of the surgeon, thorough sterilization, and from beginning to the end, gentleness.

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NOTES ON URETHRAL STRICTURES.

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A stricture of the urethra is a diminuation in its caliber due to a deposit of fibrous tissue caused by inflammation or injury of the wall of the urethra.

There may be sufficient encroachment on the canal by urethral, peri-urethral, or prostatic inflammation or abscess to form an obstruction somewhat similar to stricture but these conditions should not be classed as urethral stricture.

There is a congenital stricture not included in the above; it is less frequently observed and is a narrowness or normal tissue rather than fibrous.

CLASSIFICATION.

Strictures are subdivided into many classifications, according to size, degree of organization, mode of origin, caliber, characteristics in regard to treatment, complications present, etc. Some of these classifications are of practical value, while others are of little importance.

1. The congenital stricture does not usually respond well to gradual dilitation, but gives nearly perfect results when properly incised as there is not left a circular mass or ring of scar tissue to recontract.
2. Gonorrheal strictures.
3. Strictures due to traumatism.
4. Strictures due to introduction into the urethra of strong chemical agents for prophylaxis and treatment of gonorrhea.

Strictures of the urethra also are classed as passable and impasssable. This, however, often depends as much upon the surgeon and the instruments available as upon the stricture.

Urine can nearly always pass through even the tightest strictures.

Inflammation of various kinds often complicates urethral strictures as do many bladder and kidney affections.

SYMPTOMS AND DIAGNOSIS.

There is an infinite variety and combination of symptoms which vary from obstruction to the flow of urine so definite that the patient reports with the statements that he has a stricture and wants treatment for it, to the type so obscure that the surgeon may fail to recognize the stricture as the cause of symptoms which are altogether misleading.

Among the most frequent symptoms are: a smaller stream than normal, a persistent urethral discharge and irritation slight in character and perhaps seen only in the mornings, and sexual disturbances such as premature emissions and a lack of sexual vigor.

The suspicions of stricture may be confirmed by finding a point of narrowness with an acorn-shaped bougie.

TREATMENT.

It is generally admitted that the best method of treatment is by *gradual dilatation* with sounds and the Kollmann dilator until the urethra has been dilated to a size considerably larger than normal in order to allow for the contraction that will follow later. The dilatations may be given with intervals of one to five days according to the reaction which follows. As a rule, the urethra should not be dilated again until the irritation of the previous treatment has subsided.

In the treatment by gradual dilatation, emphasis should be placed on *gradual,* because overdilatation at any one time is undesirable for the obvious reason that if the damage to the constriction is gross or massive, it will be repaired by scar tissue and thus the stricture ultimately will be made worse. The object in dilating the constriction is to cause a necrosis of the most constricting fibers by damage so slight that it will not be repaired by scar tissue but will undergo absorption, thereby lessening the constriction.

In all urethral work it is of the utmost importance to use gentleness—always gentleness. Painstaking work is rewarded by good results while haste and carelessness may be attended by serious dangers.

Internal Urethrotomy: For various reasons it becomes necessary or advisable to perform an internal urethrotomy which is the plan to follow in incising strictures in the anterior urethra. Too much hemorrhage is likely to follow if this operation is done in the deep urethra, the external perineal urethrotomy is the operation of choice in this region.

The following are some of the reasons for incising urethral strictures; resilient ones which quickly recontract after dilatations; those which for other reasons do not respond in a reasonable time to adequate dilatations; strictures too extensive or too tight for gradual dilatation; and occasionally where the patient lives in a place too remote from a surgeon to employ the dilating method.

External Perineal Urethotomy is indicated in tight or resilient strictures of the deeper part of the urethra, that is, in the region near the external sphincter; furthermore, this operation is required where there is complete or nearly complete obstruction of the urine; for infiltration of urine and where there is stone in the bladder complicating the stricture.

It is of great importance to pass an instrument or a filiform through the urethra into the bladder to act as a guide in incising the constriction. A painstaking effort should therefore be made in all instances to pass something through the urethra as a guide for it greatly facilitates the operation; this effort should be made before the anesthesia is started. Finally, if nothing can be introduced, the patient is anesthetized and a further, though short, effort made to pass an instrument. If this fails, the perineal incision is made down to the point of the instrument in the deep urethra, then a probe-pointed gorget, or some such instrument, is carefully passed through the stricture into the bladder. This is often difficult, or perhaps impossible. When unable to pass an instrument, we have recourse to one of two methods.

First: to bore through the stricture with the forefinger until the stricture is passed. This plan has been recently advocated by Livermore and we have found it of distinct value.

Second: rather than waste too much time in searching for the urethra at the stricture and back of it, especially if there is abscess or urinary infiltration, a suprapubic cystotomy should be performed and the dilated part of the urethra back of the stricture found by retrograde sounding. This method is preferable for the average surgeon who has not had extensive experience in dealing with these conditions.

A large catheter is fixed in the urethra after external perineal urethrotomy and allowed to remain in the urethra for ten days.

The bladder is irrigated daily through the catheter with a saturated solution of boric acid.

Subsequent dilatation should be followed as in dealing with ordinary dilatable strictures.

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Hyperesthesia of the Neck of the Female Bladder.

Cauterization of the neck of the bladder with silver nitrate is indicated only in a few intractable cases and should be considered only a *dernier ressort.*—Charles G. Foote in *The Urologic and Cutaneous Review.*

URINARY EXTRAVASATION.

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The truly urgent character of urinary extravasation marked by a rapidly advancing phlegmonos cellulitis, makes it one of the gravest conditions met in practice and emphasizes the need for a more generally distributed knowledge concerning its best management. Practically every case of urinary extravasation of this serious type may be brought to a successful end, provided prompt measures are applied. They must be operated upon as quickly as possible and exposed to a minimum of shock. Platitudinous as this remark may seem, I make it in the full memory of several cases I have known to be subjected to varying periods of "watchful waiting"—with grave result to the victims.

To the term "urinary extravasation" exception is taken by some urologists. Thomson Walker, to mention one author, says it is a misnomer as generally used. If one considers that the term means the free escape of the urine out into the tissues by reason of a suddenly acquired defect in the urethral wall, or, in other words, the emptying of the entire bladder contents into the perineal, scrotal and external abdominal tissues, then the term is improper. However, some urine does infiltrate the tissues more less related to the urethra, and thus for all practical purposes, we are justified in continuing the use of the expression. Furthermore, it has the advantage of wide and long established usage. Any one who has ever cut into the swollen, edematous areas subjected to a fulminating cellulitis in consequence of a leaky urethra, will not soon forget the heavy, urinous odor of the escaping fluid.

The typical case that comes into the large urological services gives a history that parallels the following: The patient, a derelict, has had innumerable attacks of gonorrhea. If a negro, he has given them but slight heed. For some time he has had urinary difficulty. At different times he has noticed that the stream was small and the act occupied a longer period than formerly. Once or twice it stopped entirely, relief being secured by the passing of instruments. Within the preceding twelve or twenty-four hours, while straining to pass water, the patient felt something give way and a slight degree of relief was experienced. Then no more urine would come, or possibly a small quantity through the encouragement of much straining, was passed. The perineum became swollen and painful, the scrotum rapidly increased in size, and finally the patient began to realize that something serious had occurred along the lower urinary tract.

After a further wait, during which efforts were made to introduce catheters, the man comes into the hospital, the cellulitis much advanced in grade and extent, the urethal canal badly lacerated and the patient in a condition of sepsis. His temperature is high, the pulse between 120 and 140, the mouth dry, and complaint of great thirst. It must be remembered that the urinary function has been put to a strain for many months and, under the new burden, the kidneys are reacting badly.

Since the majority of tight strictures are located in the bulbous portion of the urethra, it follows that in most cases of extravasation due to stricture, the urethral tear is in the same portion of the canal. The usual route taken by the urine in these cases indicates the frequency of the tear in the bulbous portion. The anterior layer of the triangular ligament guards against access to the deeper structures in the perineum and pelvis and the escaping urine seeks the superficial perineal structures. From the perineum the extravasation extends to the scrotum, guided in this direction by the deep layer of Colles' fascia. Since this layer of Colles' fascia is not attached between the pubic spine and the symphysis, the spreading extravasation rapidly passes through this open space to reach the abdominal wall. If the urethral tear be elsewhere than in the bulbous portion then the extravasation pursues a course determined by the anatomical relation of the site of the tear. If posterior to the deep layer of the triangular ligament the condition is fraught with the most serious danger by reason of the course the extravasated urine takes. The resulting purulent infection involves the perivesical and perirectal structures and may rupture into the peritoneum with a fatal issue practically inevitable. In a rupture of the canal at a point between the two layers of the triangular ligament, the escaping urine, soon augmented by the quickly forming pus, becomes confined between the layers until rupture in some direction takes place. This may be toward the ischio-rectal fossae or into the perineum, in which latter event the picture takes on the characteristics of extravasation through the bulbous portion, provided the patient lives long enough for the occurrence of this sequence of events.

In most of these cases a cystitis has been present for months, with probably a secondary infection of the kidneys, and, in consequence, the urine is foul and of a highly infectious character. Hence, the fulminating nature of the infection and the prompt appearance of symptoms of general sepsis, which are notable characteristics of urinary extravasation.

The appearance and condition of the involved tissues indicate the virulence of the infectious process and the period of time which has elapsed since the extravasation began. In an advanced case the scrotum is greatly swollen, gangrenous and filled with a purulent fluid. The abdominal tissues are markedly infiltrated, boggy and crackle upon pressure. It is generally held that if the penis shows a grangenous spot, a fatal issue may be expected.

In cases of a chronic character, marked by abscesses and fistulae in the perineum, there has been but slight leakage. This leakage has taken place into glandular structures, the process has been slow and the resulting abscess has finally pointed or ruptured in the perineum or ischiorectal region. Ordinarly the proper treatment in such cases is to cut the stricture, preferably doing a combined internal and external urethrotomy, and then open the sinuses to the urethra, curetting and packing the tracts. However, in some instances, successful results follow dilatation of the stricture and the injection of iodine or peroxide of hydrogen into the sinuses.

But in the typical case of extravasation with sepsis present and urinary failure impending, one must give thought to but positive and heroic measures.

The prime purpose is to establish adequate drainage at the least expense to the patient's rapidly dwindling strength. If an instrument can be introduced through the damaged urethra into the bladder, this purpose is easily effected. But it must be remembered that in the average case, urinary extravasation is not a condition that permits of tedious and nicely exact surgery as would be necessitated by attempting to make a perineal section without a guide in the urethra. The tissues are altered and identification of the usual landmarks is quite difficult.

Unless a metal guide can be easily passed through the strictured region, the best plan is to attempt the passage of a Maisonneuve filiform guide. If this is successfully passed in a short trial with the patient under an anesthetic, then it is followed by the Maisonneuve urethrotome and the stricture divided. The urethrotome is withdrawn and a large sound introduced. The patient is now put in the lithotomy position and a perineal section made. Through this latter wound a gorget is slipped along the canal to the bladder. Using this latter instrument as a guide, a quarter-inch stiff drainage tube or a large catheter, fenestrated and the distal end cut off, is passed into the bladder. This provides excellent drainage and also serves to stop the hemorrhage resulting from the urethrotomy. In the event that there are old fistulous tracts, these are laid open to center at the perineal wound. They are curetted and all necrotic tissue removed. The large gaping wound resulting is packed with gauze and the edges loosely brought together. Following this procedure the infiltrated scrotal and abdominal areas are widely opened by means of multiple incisions and dressed with hot bichloride of mercury packs.

The perineal tube is removed on the fifth day and the wound permitted to granulate. Beginning on the tenth day sounds of increasing size should be passed throught the urethra. A canal that easily takes a 26 French sound may be considered of ample size to provide necessary drainage. From now on the perineal wound begins to close and, provided the urethra is kept open, prompt healing results. The areas into which the urine has extravasated are sufficiently drained through multiple incisions and there is no need for tubes.

In passing, I want to make a vigorous protest against the practice of aspirating the bladder suprapubically. To cut down upon this organ is a safer and far more logical surgical procedure than blindly to stick a trocar into it. One never knows just how far the peritoneum dips toward the pubes. Some months ago I saw a case in point. The patient had been suffering from acute retention. Unable to introduce an instrument through the urethra, the attending physician aspirated the bladder. The peritoneum, dipping unusually low, was injured. Urinary seepage took place, septic peritonitis followed; and the patient died. The simplicity of cystotomy under local anesthesia should always obviate this blind procedure.

Those cases of urinary extravasation in which the introduction of an instrument through the urethra is impossible, and we are now approaching traumatic rupture with complete separation of the two urethral ends, bring the surgeon close to the point when he must choose between suprapubic cystotomy with retrograde catheterization, and a tedious search for the canal through a badly damaged and much altered perineum. Some surgeons maintain that the employment of retrograde catheterization is a confession of the lack of one's ability to find the urethra through perineal section and, hence, is a procedure of last resort. This point, however, is open to argument. In those cases of urinary extravasation following stricture in which no instrument can be passed through the canal into the bladder, to find the urethra through a perineal incision will require a long, tedious search. The condition of these patients is such as to demand a minimum of anesthesia and surgical shock. Regardless of one's knowledge of perineal anatomy and confidence quickly to find the urethra, in cases such as these the wiser surgery, in all probability, is to employ retrograde catheterization, followed by perineal section, cutting down upon the guide introduced through the cystotomy wound. Cases of this character are best drained both suprapubically and perineally, the perineal tube being removed first, on about the fifth day, suprapubic drainage through a tube being continued for another five days. This mode of drainage permits of softening of the urethral and periurethral sclerosis and secures quicker healing of the urethral wound with reduced possibility of early re-contraction of the stricture. An important point in these cases is to make sure of an open canal anterior to the urethral opening. The perineal wound will not heal readily if tight places anterior to the ruptured point are left without proper attention. They must be dilated or divided.

In complete or practically complete traumatic rupture of the urethra the question of retrograde catheterization becomes even less debatable.

Suprapubic cystotomy with the excellent drainage thus afforded, possesses certain advantages that compensate in large measure for the added surgery and lengthened convalescence. Drainage exclusively through the urethra and perineum does not secure for the damaged parts the rest and cleanliness that suprapubic drainage does. The latter puts the urethra and infiltrated tissues at rest, promotes more prompt resolution of the inflammatory process and encourages softening of the cicatricial deposits in the case of stricture. In traumatic rupture with suture of the divided urethral ends, a cleaner and firmer union results if the urine be diverted suprapubically. The logic of diverting the urine becomes all the more obvious when one remembers that in a goodly portion of cases of stricture, a cystitis is present with a highly infectious urine. This method of drainage insures but a minimum of infectious urine trickling into the damaged urethra and stagnating on freshly cut surfaces with greatly reduced cicatrizing power, which, unquestionably, is an advantage of no mean importance. It may be an advantage of sufficient importance to compare well in weight with the equally important disadvantages of opening the bladder suprapubically.

In removing a sclerotic segment of urethra, one of the essentials required to guard against infection and promote primary union with a reduced possibility of stricture formation at the site of resection, is a preliminary suprapubic diversion of the urine. Since an attempt to secure these purposes is an accepted procedure in a deliberately inflicted severance of the urethra, why also is it not just as logical a step in the repair of an accidentally ruptured canal, in which practically the same conditions and purposes obtain?

ILLUSTRATIVE CASE.

A recent case that came into my service was that of a man aged 21 years. He fell from a height of a few feet, landing astraddle a box. For some 12 hours he was treated very conservatively. Unable to urinate, the passage of a catheter was attempted. The result of this procedure was not clear. Forty-eight hours after the accident the patient entered the hospital. A small quantity of bloody urine could be passed. The bladder was distended almost to the umbilicus. The perineum was contused and very much swollen. A condition of extravasation was present. It was impossible to introduce any sort of an instrument through the urethra into the bladder. Without further delay the bladder was opened suprapubically and a sound passed through the bladder into the urethra. The patient was put into the lithotomy position. With the sound as a guide the urethra was quickly exposed and the point of rupture located. A catheter was now introduced through the penile portion of the canal, grasped as it presented at the ruptured site, and passed on into the bladder. The urethra was moulded around this catheter and the torn edges brought into loose apposition with a few catgut sutures. The bladder was drained with a large tube above the pubes. The catheter over which the ruptured urethra was moulded, was tied in for a few days, then withdrawn. The suprapubic drain was continued for ten days, after which the wound was permitted to close over. Urine soon began coming through the canal. After fourteen days instruments were passed in increasing size until a French 26 sound could be passed. This case shows a marked tendency to stricture formation. For several weeks a fistula in the perineum persisted but with dilatations it has manifested a tendency toward complete closure, only occasionally showing a discharge of urine. Beyond this, the patient has no urinary symptoms.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor.

New York, December, 1920.

UROLOGY.

From the standpoint of diagnosis, at least, there is no branch of medicine more fascinating than urology, since it presents such nice problems for solution and such nice methods for their determination—endoscopy, cystoscopy, ureter catheterization, microscopy, bacteriology, roentgenography, and biochemical tests of urine and blood.

The urethroscope and the cystoscope expose to the eye the lower urinary tract from the ureters to the meatus urethrae. The ureter catheter permits sounding of these two channels, the separate collection of urine and urinary admixtures from each kidney, the irrigation of the kidney pelves; combined in its employment with roentgenography, it makes it possible to outline the calyces, pelvis and ureter, and often thus to present a picture by which a lesion of the kidney may be visualized, or congenital anomalies—horse-shoe, misplaced- and fused-kidneys, duplicated ureter, etc.—demonstrated. By these means the source and character of a hematuria can often be clearly determined; while, by a combination of these and other diagnostic inquiries, it can, in the more obscure cases, be fairly postulated. In this connection Hyman's contribution in this issue of the Journal will be found interesting and informative.

A relatively small, but by no means inconsiderable percentage of urinary calculi fails to cast a shadow in the roentgenogram; but the number of these that escapes detection is greatly reduced by the exploring cystoscope, the wax-tipped catheter and the search for blood cells in the segregated urines. The causes of urinary lithiasis—predisposing and immediate, and the means to prevent its recurrence, are problems that have thus far not emerged from the domain of speculation.

A surgical affection of a kidney having been discovered, it is of the greatest importance to determine also the functional capacity of that kidney and of its mate. Here we must learn the nitrogen output of each kidney (from the segregated urines); and their excretory activities can be further estimated by injections of indigo-carmine and of phenolsulphonephthalein. But these tests, we have found, are not absolute, for the presence of disease in one kidney may, reflexly, inhibit the function of the opposite, and otherwise healthy, kidney. Nor is it enough to estimate the kidney function by these or similar methods. It is also necessary to learn the extent, if any, of renal insufficiency by chemical analysis of the blood. The importance of this, the urologic problems on which it bears, and its prognostic significance are set forth in Prof. Legueu's admirable address in this issue of the Journal. It is in those cases in which both kidneys are seriously diseased, or in which both harbor menacing calculi, that the surgeon's judgment is put to a supreme test.

The study of kidney function, by blood chemistry and by dye-excretion observations, is important in "medical" as well as in surgical affections, and we may expect that advancements will be made no less by internists and physiologists than by urologists.

In contrast with the brilliant progress in urologic surgery in the past fifteen years, or in the diagnosis and treatment of syphilis during that period, the therapeutics of the most common infection of the lower urinary tract—gonorrhea, has advanced but little indeed. This disease is still treated by injections or irrigations with solutions of silver salts or of potassium permanganate or, more recently, of acriflavine—a product of war wound antisepsis. In *The N. Y. Medical Journal,* March 1, 1919, Frederic Mason, of New York, published a note on the treatment of gonorrhea by the injections of agents that penetrate and fix the cytoplasm of the gonococcus without injuring the host, the first agent being a "sensitizer" and the second a "developer." The rationale and technic of this procedure he further describes in this issue of the Journal. Similarly, Young, White and Schwartz evolved "mercurochrome" (a mercury compound of fluorescein) as a bactericide (*Journal of the A. M. A.*, November 15, 1919). Both of these injection means have given favorable results as reported by their authors. The difficulty that confronts all bactericidal treatment by irrigation or injection is that the organisms they are intended to reach are not on the surface of the urethra but in its recesses. The specific gonococcide that can be brought to act in these recesses has not yet been found.

ALL-AMERICA CONFERENCE ON VENEREAL DISEASES.

Of interest to urologists and, indeed, to the profession generally, is the Conference on Veneral Diseases meeting in Washington, D. C., December 6th to 11th, under the auspices of the U. S. Interdepartmental Social Hygiene Board, U. S. Public Health Service, American Red Cross, and American Hygiene Association, with Prof. Wm. H. Welch of Johns Hopkins as president. The conference will discuss the problems of medical control, involved in both diagnosis and treatment, of administrative control, of educational propaganda, law enforcement and social influences.

Surgical Suggestions

In infants and small children a large abdominal tumor is most often a sarcoma of the kidney.

If a prostatic calculus occupies a urethral pouch, it is important to destroy that pocket, lest calculi re-form in it.

The more nearly completely a kidney is disorganized by disease the more safely can it be removed, so far as the functional value of the other kidney is concerned.

If pus containing no gonococci is found in the prostatic fluid of an individual who has for years been free of any local infection a calculous prostatitis should be suspected.

A stone-bearing prostate may be found upon rectal palpation of normal size and contour and not unusually sensitive; or it may be enlarged, nodular or lumpy, and exquisitely tender. "Lumpiness" and great tenderness are very suggestive, but not diagnostic of stones, since they may arise from other conditions. If crepitation of the concretions is felt by the examining finger this *is* diagnostic.

A single stone in the urethra that is not known to have escaped from the bladder should suggest an inquiry into the possibility of more stones in the prostate.

When prostatic calculi have formed, inflammatory changes take place in the gland—fibrous tissue growth and, sometimes, suppuration. Clinically, therefore, as well as pathologically, we must have in mind the conception not merely of calculi in the prostate but of a *calculous prostatitis*.

A single stone or a small group of stones in the prostate gland should be removed by a perineal prostatotomy. The removal of multiple, scattered stones requires the removal also of much of the gland itself—an incomplete prostatectomy. Since this will not leave merely a collapsible capsule, as after shelling out the adenomatous prostate, the perineal is here preferable to the suprapubic route.

Progress in Surgery

Selections from Recent Urologic Literature.

Edward Bleier, M.D., Abstract Editor.

Ointment Medication of the Urethra. Irvin S. Koll, Chicago. *The Urologic and Cutaneous Review*, September, 1920.

The method employed by the author has been in use seven years and has given uniformly good results. The ointment is put up in collapsible metal tubes, the end of which is shaped like the tip of a urethral syringe, a key is turned at the opposite end which forces the ointment into the urethra.

Albargin, one per cent. in strength, is the drug used for gonorrheal infections. Oxycyanide of mercury, one to two thousand in staphylococcus urethritis and the solution of aluminum acetate one per cent. if the offending organism is the colon bacillus. The astringent preparations are zinc sulphate one and one-half per cent. with one-half per cent. of alum copper sulphate two per cent. is also occasionally prescribed in this form.

In acute gonorrheal urethritis the albargin ointment is used three times daily and each injection retained fifteen minutes.

In addition to the therapeutic efficacy of these tubes, they have the advantage of cleanliness and ease of application and in general are very satisfactory to the patient.

The Diagnosis of Inflammations of the Male Urethra. Abr. L. Wolbarst, New York. *New York Medical Journal*, October 9, 1920.

Wolbarst lays particular emphasis on the necessity for accurate diagnoses in inflammations of the urethra, with special reference to the various etiological factors. In the acute cases it is most important to determine the specificity of the lesion. The micrococcus catarrhalis is a frequent cause of urethral discharge. Smears or cultures will readily make the diagnosis. Bacillus coli may occasionally cause a urethral discharge, and is probably associated with suppuration in the prostate or epididymis. Other rare causes are the pyogenic organisms of the mouth, syphilitic cancer or chancroid in the region of the urethral mucous membrane. In gonococcal urethritis the diagnosis is usually made clinically, but it should always be verified by smears of the pus. In nearly all cases a typical triad of symptoms, angry meatus, profuse discharge, and purulent urine are present. The absence of any-one of these should raise suspicion as to the etiology.

In chronic urethritis the problem is more difficult. The problem here is to locate the source and the character of the lesion. The usual causes are stricture, folliculitis, prostatitis and vesicultits. Urethroscopy is absolutely essential for accurate diagnoses in these conditions.

In chronic inflammation, stricture, folliculitis, prostatitis, vesiculitis, and colliculitis are predominating causative factors. The diagnosis must be arrived at through precise scientific measures, not through guesswork.

The Treatment of Gonorrhea of the Male Urethra.

Edward L. Keyes, Jr., New York. *Journal of the American Medical Assoc'ation*, November 13, 1920.

Inasmuch as the essential pathologic lesion of the chronically inflamed urethra is an infiltration of its submucosa, the essential treatment of chronic urethritis, according to Keyes, is dilatation which shall be made to simulate massage as nearly as possible—dilatation applied both to the anterior and to the posterior urethra so far as the inflammation affects both portions of the canal. Dilatation should not cause bleeding. for bleeding is evidence of laceration, laceration is the occasion of infiltration, and infiltration is the lesion that we are seeking to relieve. Dilatation should not attempt to stretch scar tissue, because scar tissue cannot be stretched. The anterior urethra may profitably be dilated to from 28 to 32 F.; the posterior urethra (by means of the Kollman dilator) to from 33 to 38 F The intervals between treatments should be from five to ten days. The application of injections and irrigations, however antiseptic, to the surface of the urethral mucosa can have but little effect on its pathologic processes. A mild urethral discharge may be controlled by a mild injection, and for this purpose astringent injections of zinc sulphate and similar substances are far more efficacious than are the antiseptics. If the treatments are gentle, it is often quite as well not to introduce any antiseptics into the urethra; but when beginning with a patient, or if there is any possibility of a reaction following the treatment, an antiseptic which washes out the major number of bacteria and tends to diminish the vitality of others is worth while. Massage of the prostate and seminal vesicles is the best substitute for the processes of Nature, and has the added advantage of being conducted in a relatively calm spirit. The urethroscopic treatment of granulations in the posterior urethra by the application of chemicals is most useful in cases that resist treatment by dilatation. But the urethroscopic treatment is not to be considered one of choice to replace dilatation—dilatation is always of the essence of the treatment of chronic urethritis.

The Operative Treatment of Congenital Deformities of the Lower Urinary Tract. With Special Reference to the Formation of a Compressor Urethrae.

Ralph Thompson, London. *The Lancet*, October 16, 1920.

The author reports five successfully treated cases. One case of epispadias, one of ectopia vesicae, and three of hypospadias. The most interesting procedure is the use of a flap of rectus muscle for the formation of a substitute compressor in the case of epispadias. The author first proved by dissection and experiment that a flap of rectus as proposed could be feasibly used for this purpose.

Detailed descriptions of the operation for epispadias, ectopia and hypospadias are given.

Spermatocele.

Edward T. Crossan, Philadelphia. *Annals of Surgery*, October, 1920.

Crossan reviews the subject of spermatocele from the historical and practical standpoint. The definition accepted by the author is one which should include all types of lesions grouped under the classification, *e. g.*, spermatocele is a cyst originating in the scrotum, and which is or has been in communication with the semen-carrying system. It need not therefore always contain spermatozoa. From a review of the literature regarding the origin of the lesion, it can be said that spermatoceles arise most frequently from the vasa efferentia and vas aberrans superior, often from the sessile hydatid, and only occasionally from the vas deferens, pedunculated hydatid, and organ of Giraldes. Of the various factors that have been mentioned as the cause of this lesion, such as trauma, sexual abstemiousness, and gonorrhea, the author is inclined to favor trauma. The kind of trauma to the scrotum that produces spermatocele is not exactly known, for while trauma to the testicle is frequent, spermatocele is quite rare. The cysts may be intra or extra-vaginal. The cyst wall is made up of connective tissue fibers, with some strands of smooth muscle, while the lining consists of ciliated or cylindrical epithelium. The contents are usually milky or soapy in color. On microscopical examination they show lymphocytes, fat globules, epithelial cells, and spermatozoa, rigid or motile. The chief symptom is the swelling, although there may be pain in the testicle on excitation. On physical examination, the only symptom is the tumor, usually a globular mass sitting on top of the testicle. The only treatment is operation, removal of the cyst, or castration where the testicle is atrophied.

A Consideration of the Varicocele Operation and the Avoidance of the Post-operative Induration.

Penn. G. Skillern, Philadelphia. *Annals of Surgery*, October, 1920.

The undesirable sequel of the operation for the cure of varicocele, referred to by the author is the column of induration which forms. This usually extends from the testicle upwards to the external inguinal ring. This often persists for several weeks and is more annoying than the condition for which the operataion was done. The causes of this column are: (1) Limited resection of veins with end-to-end suture of the stumps: this results in stagation of blood in the vessels, with a lump at the site of the stumps: (2) failure to obliterate the dead spaces established by dissection of the fascial layers: these spaces furnish room for the outpouring of blood and juices after operation: (3) irritation of the vas deferens from rough manipulation; the vas in very sensitive to trauma to which it reacts by swelling to several times its original size.

The ideal varicocele operation must remove all the veins involved. No dead spaces must be left; these are usually caused by edge-to-edge apposition of the fascial layers or no suturing of the layers at all. There must be no trauma to the vas. The author describes in detail the method used which avoids the complication referred to.

The essential features of his operation are: Complete removal of the affected veins throughout their entire length from testis to internal ring. The cremaster muscle is sutured down snugly over the vas, and if desired, the muscle may be slightly shortened by transverse sutures to raise up the testicle. The scrotum should not be shortened by resection. The external oblique and Scarpa's fascia are closed as separate layers, and the latter tacked down to the former to obliterate any possible dead space. The cut edges of Camper's fascia are similarly sutured. After following this technic, the author finds that the undesirable column of induration does not occur.

Orchitis From Mumps: The Need ot Conserving the Testes by Incision of the Tunica Albuginea.

Edgar G. Ballenger and Omar F. Elder, Atlanta, Ga., *Journal of the American Medical Association*, November 6, 1920.

It is asserted by Ballenger and Elder that the present method of treating orchitis caused by mumps is inadequate. This is shown by the large number of atrophied testes observed. The rational plan of procedure, which they have adopted, is to incise the tunica albuginea and relieve the pressure, and at the same time allow the escape of some of the toxic substances produced by the organisms which cause mumps. This must be done early in the disease before the necrotic process has become established.

The Diagnosis of Prostatism. Frank Hinman, San Francisco. *Northwest Medicine,* September, 1920.

Hinman discusses the symptom-complex termed "prostatism" and outlines the method of procedure in differential diagnosis of the pathological conditions causing it. He presents several outline tables, showing the causes and procedure for complete examination and differentiation.

Prostatism is the term applied to the symptom-complex caused by hyperplasia, cancer of the neck of the prostate, or contracture of the vesical neck. The direct cause of symptoms is obstruction or urination. Frequency of urination usually with difficulty is the common clinical evidence of obstruction, but this symptom is very frequently associated with other conditions than prostatism. One of the most characteristic symptoms of prostatism is the gradually increasing inability to completely empty the bladder which is usually coincidental with progression in the symptoms of frequency and difficulty. Other conditions also lead to residual urine, and a careful diagnosis requires accurate and systematic, clinical, chemical, microscopical, and cystoscopic study.

Tuberculosis and chronic inflammatory changes produce fibrous infiltration which simulates the stony hardness of the ordinary cancer, and stones in the prostate may be of such size and position as to be mistaken for cancer. Cancer commonly starts in the posterior lobe and spreads by extension along the ducts, or by direct cell invasion, so as to involve first the seminal vesicles and base of the bladder. The mucous membrance of the urethra and bladder are quite resistant, nor does the rectum ever become involved except rarely in very late stages. Blood metastases are usually late. Tuberculosis is characteristically nodular on palpation and rarely primary in the prostate. The commonest genital type is unilateral tuberculous epididymitis, between the ages of 20 and 40, involving primarily the globus minor, and secondarily the vas and seminal vesicle. In the later stages bilateral lesions are found. Rarely would the differentiation of cancer and genital tuberculosis lead to much confusion.

Chronic fibrous inflammatory infiltration may at times be differentiated with difficulty. Chronic inflammations can give extreme hardness, and doubtless everyone who sees many prostatics has mistaken these cases for cancer and vice versa. Prostatic stones may ordinarily be demonstrated by *x*-ray and in all suspicious cases this method of examination should not be neglected.

The diagnosis of prostatic cancer is made almost wholly by the findings upon rectal palpations. This limitation of method in arriving at a diagnosis and the late development of symptoms indicative of cancer that would arouse clinical suspicions renders early recognition of the lesion difficult and in point of fact quite exceptional. The stony hardness is so characteristic that recognition in the late stages after symptoms have developed is relatively simple.

The size and shape of the prostatic surface outlined per rectum is an important step in the diagnosis of hyperplasia. A normal gland has the general shape of a horse-shoe chestnut with a well-marked furrow, a pronounced notch and rounded lateral lobes with sulci at the sides between each lobe and the rectal wall. In hyperplasia there is at first an obliteration of the furrow, then of the notch and finally general enlargement of the whole surface, so that the lateral sulci become deeper and deeper and the upper border higher and higher until in the larger types the examining finger cannot reach the upper limits of the enlarged gland. In hyperplasia definite elasticity is the rule; sometimes the consistency is soft and boggy. There may be types of intravesical enlargement, in which the changes noted per rectum are indefinite. Such types of enlargement can only be definitely diagnosed upon cystoscopy. Often these types produce the more troublesome obstructions. Negative or indefinite rectal findings, therefore, do not exclude the possibility of the presence of pathogenic hyperplasia.

In contracture of the vesical neck rectal palpation gives negative findings except, perhaps, for the ordinary evidence of chronic prostatis and vesiculitis. The presence of the contracture is intimated in no way by palpation. But negative rectal findings in the presence of typical prostatism and residual urine have a tremendous significance. Such a condition may occur with intravesical hyperplasia without enlargement per rectum, with spinal cord lesions and with contracture of the vesical neck. In the cases of spinal cord disease relaxation of the anal sphincter is ordinarily coincident with that of the internal vesical sphincter. The three conditions are definitely differentiated by cystoscopy. Before cystoscopy, however, is undertaken, a good impression of the probable cause of the symptoms should have been made by the course of the routine procedure of examination as just outlined.

The Intravesical Treatment of Benign Tumors of the Bladder by Chemo-coagulation. Eugen Joseph, Berlin. *The Urological and Cutaneous Review,* September, 1920.

Joseph has found Beer's method of thermo-coagulation (fulguration) perfectly satisfactory as a method of treatment in benign papillomata of the bladder, especially when the tumors are small. The treatment is convenient, quick and exact. In very large papillomata, however, the treatment is too slow and requires too long a period of time, as only a small portion of the growth can be attacked at each sitting. Operation is condemned.

For this type of case, Joseph uses chemo-coagulation by means of the direct application of trichloracetic acid. The crystals are warmed, and they dissolve readily in their own water of crystallization. A few drops of glycerin are added to prevent re-crystallization. The injection syringe should be slightly warmed.

The catheter should be about 25 cm. long and of small diameter. By aid of the cystoscope the ureteral catheter is brought in contact with the growth, so that the catheter opening is brought directly over the tumor in order that when the acid is injected it should fall over it from above. When the cathether is properly placed the assistant is directed to inject the acid slowly by means of the attached glass syringe. When the acid comes in contact with the growth it turns it snow-white, so that it soon assumes a frozen appearance. Care should be taken that none of the acid comes in contact with the surrounding mucous membrane. Fortunately, however, the bladder mucous membrane is quite more resistant to the acid than the growth itself, and should any of the acid damage it, it would heal up in about three weeks. But any damage to the mucosa can be avoided by attention to the following rules:

(1) The beginner should handle large papillomata only where treatment by thermo-coagulation is too inconvenient and slow. In such a case it would be easy to spray the acid on the growth from above without getting any of it on the surrounding mucous membrane. If, as a result of the chemo-coagulation, the largest part of the growth is destroyed and only a small piece or pedicle is left, this remaining part may be treated by thermo-coagulation not for the purpose of fastening the cure, but for preventing the acid from damaging any of the adjacent mucous membrane.

(2) In the treatment of small papillomata by chemo-coagulation, great care is essential. The acid must be injected very carefully, not more than a few drops to come in contact with the growth.

(3) The period between treatments, during which time there tends to be an inflammatory reaction surrounding the growth, should be three or four weeks, until every sign of the inflammatory reaction is gone.

(4) Chemo-coagulation is only applicable to soft papillomata. The solid, nodular growths are influenced but slightly. It is true that they will also show some whitish necrosis, but the action is not deep and does

not affect the growth in its depth of origin. In these growths chemo-coagulation is of signal service in preventing or treating hemorrhage and secretion. It works in the same way as zinc chloride application in inoperable uterine carcinoma. Solid growths that neither bleed nor secrete I consider useful for treatment with trichloracetic acid, because the action is not deep enough to destroy the tumor and it produces a severe inflammatory reaction which causes suffering to the patient.

After chemo-coagulation the bladder should be at once emptied and irrigated.

Fulguration in Tuberculous Cystitis. (*De L'Etincelage dans la Tuberculose Vesicale.*) A. PARISI. *Journal d'Urologie,* Vol. 9, No. 5-6.

In a very comprehensive article, Parisi reviews the subject of tuberculous cystitis, laying particular emphasis on the cases in which the distressing bladder symptoms persist, after nephrectomy for tuberculosis of the kidney. The statistics on this subject do not agree, but it can be definitely stated that a good percentage of cases do not clear up symptomatically after nephrectomy. In those cases in which bladder symptoms do disappear, it is probable that the symptoms were reflex, the so-called "irritable bladder" encountered in renal tuberculosis. It is doubtful whether true tuberculous lesions of the bladder will clear up after removal of a tuberculous kidney. The main factors in these rebellious cases are, partial removal or failure to remove a tuberculous ureter, tuberculosis in the second kidney. The symptoms and cystoscopic findings are minutely described. Many varied pictures may be obtained. There may be ulcerations, vegetations, diphtheritic membranes, or edematous bullae. The danger of leaving a residual cystitis untreated, in addition to keeping up the symptoms indefinitely is, ascending infection of the remaining kidney. The author describes in detail the technique of fulguration in these cases with a complete description of the results in 21 cases.

His conclusions are:

1. The method of fulguration is a cystoscopic procedure, which is applicable to all cases of residual cystitis after nephrectomy for tuberculous.

2. Fulguration is applied at long intervals, requiring only a few séances. This is quite contrary to other methods of treatment which require frequent intravesical treatments which are quite distasteful to the patient. The antiseptic value of the high frequency adds to the other advantages of the treatment.

3. The precise indication for fulguration is the type of cystitis characterized by the ulcerous lesions. It is in these cases that the highest percentage of cures are obtained. The treatment may be used in addition in other cases with crusting or fungoi formation.

4. High tension current is best adapted for this work, although low tension (Arsonval type) may be used. The entire surface of the ulcer or other lesion should be treated. The treatment is easily controlled by the cystoscope, noting the blanching at the point treated. Treatments should be about fifteen days apart. Cocaine, 4 per cent, is used as an intra-vesical anesthetic in most cases.

5. There may be a severe reaction after the treatments, manifested by polyuria and violent pain, but this rarely lasts more than two or three days. There have been no accidents with the treatment, except one case of nocturnal incontinence. In 21 cases there were 10 cures, 9 improved, and 2 unimproved.

6. Fulguration with the high frequency current should have a definite place in surgical therapy. It should be applied in the residual or rebellious cases following nephrectomy. It might be possible that treatment applied to the ureter in residual ureteral tuberculosis may accomplish similar results.

The Treatment of Calculi Impacted in the Pelvic Portion of the Ureter. FRANK KIDD, London. *British Medical Journal,* July 30, 1920.

Kidd outlines the methods of diagnosis, and the procedure to be followed in these cases.

Before a decision is made that an x-ray shadow in the pelvis is due to a stone in the ureter it is absolutely essential to employ special methods of differentiation. One method is to pass up the ureter a bougie opague to the x-rays and take another x-ray picture. In many cases the shadow of the tip of the bougie can be seen touching the doubtful shadow, but sometimes the evidence thus obtained is not conclusive. Another method is to inject 20 per cent. colloid silver into the ureter through an ordinary ureteric catheter and then to take an x-ray picture. If a stone is present there will be seen the shadow of a dilated ureter above the stone shadow, which will appear to be lying at the site of a narrowed portion of the ureter; such evidence, if it can be obtained, is conclusive that the doubtful shadow is cast by a stone. Another method is to pass wax-tipped bougies up the ureter, when scratches can be detected on the wax.

The practical point remains that no operation should be undertaken on the ureter for the removal of stone until supplementary x-ray methods have been employed in addition to ordinary x-ray methods.

Conservative methods should always be employed before open operation is resorted to.

Kidd describes the following methods for coaxing a stone down the ureter:

In the first place the patient should be flooded with diuretic waters, and should take regularly every day urinary antiseptics by the mouth with the object of preventing bacterial infection if it has not already arisen. A cystoscope should be passed and various methods of cystoscopic extraction tried. These methods are, briefly, as follows:

1. Injection of sterile paroleine through a ureteric catheter around the stone may induce a stone to pass a few days later. In 4 cases Kidd obtained success in this manner.

2. Recently it has been suggested by Geraghty and by Walther to inject 5 c.cm. of a 4 per cent. solution of papaverine sulphate locally into the ureter through a catheter. This alkaloid causes direct relaxation of unstriped muscle fiber. It causes relaxation of the ureteric muscle in the region of the stone, and has been successful in causing stones to pass naturally.

3. With the operating cystoscope and the special scissors of Bransford Lewis it is possible to cut up the superior wall of the mouth of the ureter, starting from the mouth of the ureter and through the wall of the bladder for at least three-quarters of an inch. After this minor operation has been done it is possible to try and pull the stone down with forceps or to dilate the ureter with a probang through the cystoscope. So far Kidd has failed to catch a stone with forceps after this operation and pull it down, but in nine cases the stone has been passed naturally within a few days after he has cut the mouth of the ureter in this manner. In some cases he has been able to observe the slit some months afterwards. It appears to heal up soundly without stricture formation and causes no bad after-result. The lower end of the ureter is often very narrow in these cases and appears to be the main cause which prevents the stone from passing naturally. This method appears to be a triumph of manipulative surgery when we can thus get a stone to pass and save the patient from a major operation. Progress in surgery consists in substituting minor surgical procedures for major surgical operations. The treatment of villous growths of the bladder by fulguration through the cystoscope is another good instance. Surgeons are still very slow to adopt these methods and to give more spectacular and more dangerous procedures.

4. It is possible to cut the mouth of the ureter in similar fashion, using the insulated copper and platinum electrode through a cystoscope attached to a diathermy machine. In several cases this has been done successfully, but Kidd prefers the scissors method.

5. Finally, it has been suggested to pass a ureteric catheter, with a small dilatable bag attached, as far as the stone. The bag is dilated with air, and traction is made so as to dilate the ureter below the stone. The principle is similar to that of the bag used in midwifery for dilating the mouth of the uterus.

The methods briefly mentioned should be given a fair trial before an open operation is performed. Those, then, who wish to deal with these cases should make themselves familiar with the technique of operative cystoscopy.

The methods of operation are well-known; the author describes the types he has found most valuable.

Ureteral Transplantations. Robert V. Day, Los Angeles. *The Urologic and Cutaneous Review*, August, 1920.

Objectively ureteral transplantation in general may be classified as follows:

1. For the purpose of sidetracking the urine for congenital defects, such as exstrophy (bowel implantation).

2. (a) Skin transplants in conditions where the patient has a reasonable expectancy of a few years of life if transplanted, as occasionally occurs in advanced tuberculous bladders that will not or have not healed after a long time, and the remaining kidney is but slightly infected and the function good; or in case of bilateral infection with the function in one fairly good, with the aforementioned highly contracted exquisitely irritable tuberculous bladder. Such cases by transplantation (where there are no tuberculous lesions elsewhere in the body) may be reasonably expectant of one, two, or even three years more of life comparatively free from pain and have far better health. (b) Or a skin transplant may offer a lengthening of life for a number of years in rare instances, where there exists trauma and infection on one side and there is doubt as to the future functional efficiency of the opposite kidney.

3. For purely palliative purposes

There are three types of cases in which this is applicable and preferable:

First, and most important: In cases of advanced and incurable tuberculous bladder with intractable vesical symptoms where both kidneys are tuberculous, or in case of a previous nephrectomy on one side, the other side has become so involved that an exquisitely irritable contracted viscus exists and suprapubic drainage would be of no avail, or having been instituted, has not sufficed, or has lost is usefulness by reason of further contraction of the bladder, making any kind of suprapubic drain intolerable.

Secondly, in carcinoma of the cervix, complicated by vesico-vaginal fistula and persistently excoriated skin that is maddening to the patient; or, in case of obstruction on one or both ureters, partial or complete, from carcinomatous infiltration primary in the cervix.

Thirdly, (a) in advanced cases of bladder carcinoma where suprapubic drainage would probably not be palliative, or having been instituted, has not relieved the tenesmus; or, (b) cases of nearly complete anuria from obstruction of the intramural portion of the ureters from carcinomatous infiltration at the base.

Bowel implantation is essentially an easy operation and given a normal ureter (without dilatation), with no kidney infection and a normal function, implantation into the gut offers a fair prognosis for a few years at least. However, with a dilated ureter and already infected kidney, ureter-to-gut anastomosis is practically a death sentence in from five to twelve days.

Transplantation into the bladder may be easy or most difficult—but almost never so easy as bowel insertion.

Ureteral transplants to the skin is an act of mercy in certain advanced cases of bladder carcinoma. It is all of that in some cases of bladder tuberculosis and, moreover, markedly prolongs life and lessens invalidism. It prolongs life in certain carcinomatous invasions from adjacent extra-urinary organs. Unlike any other anastomosis of the ureter, the kidney is not insulted in the slightest and drainage can be made perfect. Even bilateral anastomosis to the skin at one sitting is almost devoid of shock in the feeble. It is a most rapid and efficient method of treating pyelitis and restoring kidney function to the maximum in such cases as have been described.

Uretero-cutaneous transplant is one of the easiest operations of genito-urinary surgery.

With a soft catheter inserted just within the kidney pelvis, all insult to the kidney from edema of the orifice at the distal end of the transplanted ureter is prevented.

Nephrostomy is unsatisfactory and the kidney is pretty sure to get badly infected.

Transplantation of the ureters in the back, besides being inconvenient to care for, gives the transplanted ureter too abrupt a turn.

Where a kidney is to be saved in a patient with the opposite kidney functioning poorly, transplantation into the opposite ureter will probably lead to constriction, back pressure, and ultimately severe infection.

Abdominal Pain in Diseases of the Kidney and Ureter. Arthur B. Cecil, Los Angeles, *Journal of the American Medical Association*, November 6, 1920.

This study is based on a critical review of 300 cases in which a complete urologic investigation was carried out on the upper urinary tract. It was undertaken for the purpose of determining the frequency of occurrence and distribution of abdominal pain in association with diseases of the kidney and ureter. There were sixty-seven cases of stone in the kidney or ureter. Most of them occurred between the ages of 30 and 44. Blood was found in the urine in fifty-six cases, pus in fifty-four, albumin in thirty-two. Thirty cases showed bladder disturbances. Pain was present in every case, and in the large majority of cases the patients presented themselves for treatment on account of pain. In a few instances, hematuria was the principal complaint. Twenty-one cases presented typical renal pain. Nineteen cases presented pain in the abdomen alone. In twenty-six cases, pain in the back was associated with pain in the abdomen. The confusing nature of abdominal pain in cases of stone in the kidney and ureter is well brought out by the fact that in thirteen of the sixty-seven cases studied, various surgical procedures had been undertaken for the relief of pain in which the symptoms were in no way changed, and in which it has been demonstrated that the pain was of renal origin. In eight cases stone had not been diagnosed. A diagnosis of appendicitis had been made in five cases, gallstones in two cases, and ptomain poisoning in one case. The position of the stone, whether in the kidney or in the ureter, had little bearing on the distribution of the pain. In a group of forty cases of renal tuberculosis every case showed pus in the urine. Blood was found in the urine in thirty-eight cases, and albumin in thirty-four cases. Tubercle bacilli was found in every case directly by side investigation, and only in a few instances was a guinea-pig injection of any help. Abdominal pain was present, without pain in the back, in seven cases. In six cases, pain in the back was associated with pain in the abdomen. Pain in the back alone occurred in eight cases. In eighteen cases, no pain was complained of, and the symptoms were entirely limited to the bladder. No abdominal operations had been performed for relief of pain. Of seventy-seven cases of pyelonephritis pus was present in the urine in seventy-three cases; blood in forty-six; albumin in fifty. Of fifteen cases of left renal infection there was no pain in seven cases. In fifteen cases of right renal infection, pain was absent in five cases. In twenty-five of the forty-seven bilateral cases there was absence of either abdominal or renal pain. In only two instances were abdominal operations performed with the idea of relieving abdominal pain in this series of cases of pyelonephritis. Hydronephrosis and hydro-ureter comprised twenty-six cases. The urine showed pus in nineteen cases, blood in seventeen and albumin in fifteen. Bladder disturbances were present in thirteen cases. Pain, usually severe, was present in all these cases, either in the abdomen or in the back. Of two instances of tumor of both kidneys, one presented pain in the right upper abdomen, the other, colicky pain across the upper abdomen and left lower abdomen. Neither showed pain in the back. One case showed pain in the right back without any associated pain in the abdomen. One cases of hypernephroma presented pain in the renal region, but no abdominal pain. There was no abdominal pain or bladder disturbances in a case of polycystic kidney. Cecil advises that in obscure cases of abdominal pain, pyelographic studies should be more frequently made. Urgency of operation in obscure abdominal pain does not often depend on severity of the pain alone. Some of the severest types of abdominal pain have as their origin diseases of the kidney and ureter.

Recent Progress in Kidney and Ureter Surgery.

Daniel N. Eisendrath, Chicago. *Medical Record,* October 16, 1920.

Progress has been along three lines chiefly: (1) In diagnostic methods; (2) in operative technique and the application of non-operative methods of treatment, and (3) in the more accurate interpretation of certain familiar clinical symptoms such as ureteral colic, pyuria and hematuria.

1. *Improvements in Diagnostic Methods.*—These have been chiefly the result of the perfection of radiography as applied to the urinary tract, the chemistry of the blood as it interests the urologist and the bacteriologic study of renal infection.

(a) Pyelography and Ureterography. The pyleogram of a normal kidney shows in addition to the ampullary portion three major calyces, namely: superior, middle, and inferior, from each of which arise a number of minor calyces.

Variations from the normal pyelogram are not difficult to distinguish so that pyelography is of the greatest assistance in the diganosis of a number of surgical affections of the kidney. The increase in size of the shadow with widening of the narrow portions of the major calyces and a club-like dilatation of the minor calyces enables us to recognize the presence of an inflammatory or mechanical dilatation (hydronephrosis) of the renal pelvis.

In renal tuberculosis the eroded appearance of the calyces or the presence of widely scattered shadows is very characteristic.

Ureterography, the opaque catheter and the employment of stereoscopic *x*-ray exposures enable us to disminish the percentage of error in the differentiation of true (intraureteral) from false (extraureteral) shadows.

(b) Radiography alone without the aid of the opaque catheter, stereoscopy, pyelography, and ureterography enables us to tell with a fair degree of accuracy the exact location of calculi in the kidney, i.e., whether in the pelvis proper, in one of the calyces, or in the parenchyma. In cases giving the typical history of calculus in the upper urinary tract it is often possible to intensify a weak or doubtful shadow by the application of the principles underlying pyelography and ureterography, i.e., taking a second picture after impregnating the calculus (through the ureteral catheter) with a solution giving an *x*-ray shadow.

The differentiation of true intrarenal from false extrarenal shadows, such as calcified glands, gallstones, etc., has been rendered far easier through the introduction of the opaque catheter and the use of pyelography.

In renal tuberculosis, radiography alone is of great service in diagnosis when it is impossible or undesirable to catheterize the ureters. The recent observations of Braasch, Colston and Waters have shown that one can readily recognize the more advanced cases of renal tuberculosis by the appearance of the kidney on the *x*-ray plate.

2. *Improvements in Operative Technique and in the Application of Non-operative Methods.*—Of chief interest are (a) the study of the anomalies of the renal vessels and (b) the almost general substitution of the operation known as pyelotomy for that of nephrotomy.

The presence of accessory arteries and veins passing directly from the aorta, vena cava, or iliac vessels to the upper or lower poles of the kidneys compels the operator to expose these poles carefully in order to avoid serious bleeding during or after operation on the kidney.

Nephrotomy for the removal of calculi is followed in a fairly large percentage of cases by secondary hemorrhage, hence it is being used less frequently from year to year. The route of election is through an incision in the posterior surface of the renal pelvis where the danger of bleeding is reduced to a minimum.

The treatment of infections of the kidney involving chiefly the pelvis has been greatly simplified as the result of the direct applications of antiseptics to the renal pelvis when injected through the ureteral catheter. Pelvic lavage enables us to cure many a severe case of pyelitis which formerly proved resistant to ordinary treatment. In the study of the bacteriology of the upper urinary tract smears made from sediment obtained after the use of the high power centrifuge have almost completely supplanted cultures or animal inoculation.

The non-operative delivery of ureteral calculi is a method which should be given a fair trial before operation is decided upon.

Occluded Renal Tuberculosis.

W. F. Braasch, Rochester, Minn. *Journal of the American Medical Association,* November 13, 1920.

Braasch states that renal occlusion occurs in about 10 per cent. of the cases of chronic renal tuberculosis. It can be recognized by means of clinical, roentgenographic and cystoscopic data in fully 90 per cent. The usual symptoms are persistent frequency, dull pain or abdominal tumor; they usually extend over a period of many years. The occluded kidney may be a focus of infection, if the occlusion is of recent occurrence. If it has existed for many years it usually becomes sterile. In the presence of persistent frequency, dull pain or abdominal tumor, nephrectomy is indicated. The post-operative results are usually excellent, with recovery from the various symptoms. In case of bilateral tuberculosis, the removal of an occluded kidney will not benefit the patient and operation should not be performed.

Papillomatous Epithelioma of the Kidney Pelvis.

P. E. McCown, Indianapolis. *Journal of the American Medical Association,* October 30, 1920.

Forty-eight papillary tumors of the kidney pelvis are analyzed on the basis of cases reported in American and foreign literature. In listing the symptoms, hematuria was reported in twenty-three cases and hematuria with renal colic in twelve cases, palpable tumor fourteen times and abdominal pain in eight instances, while in six cases there was reported frequency or painful urination. As illustrating the possible malignancy of this condition, eleven authors report metastasis as being present at the time of examinations or developing in the later course of the disease. It would seem, however, that all cases are potentially malignant since this is the outcome of untreated papillomas of the bladder. Roentgenoscopy has not proved much aid in the diagnosis of these conditions. Nephrectomy is the treatment indicated, and since the ureter and bladder show a strong tendency to become involved, it would seem best to perform complete ureterectomy at the time the kidney is removed or soon after. Secondary growths on the bladder mucosa can be easily destroyed by fulguration unless they have become malignant. A study of these cases shows that malignancy is not an early development, giving all the more hope for complete cure by nephroureterectomy.

Progress in Nephrectomy. A Study Based on a Series of Two Hundred and Seven Cases

Edwin Beer and Abraham Hyman. New York; *Journal of the American Medical Association,* October 30, 1920.

This article by Edwin Beer and Abraham Hyman is based on a series of 207 nephrectomies with a mortality of 3.8 per cent. Of the 207 nephrectomies, 189 were primary, 18 secondary; 199 were lumbar extirpations, 8 transperitoneal. Subcapsular nephectomy was performed twelve times. Two of the eight deaths occurred after secondary nephrectomy. The majority of patients were operated on under gas and ether; gas-oxygen was used in fifteen cases, and spinal anesthesia in two. The unquestionable value of cystoscopic and functional examinations in lowering the mortality is emphasized especially in the reduction of the death rate from uremia. Full details are given.

Book Reviews

Manuel D'Urétroscopie. By Robert Henry and André Demonchy. Octavo; 113 pages; 56 illustrations and 5 color plates. Paris: Masson Et Cie, 1920.

This little work is valuable, if for no other reason, in that it emphasises the necessity for the use of the urethroscope in the diagnosis and treatment of chronic urethral conditions.

The first chapter is devoted to the discussion of the indications for urethroscopy, and very properly cautions against its use in the acute stage of gonorrheal and other inflammations of the urethra. But the authors, with equal propriety, urge its systematic application in the subacute and chronic stages when all acute inflammatory symptoms have subsided and the gonococcus has disappeared from the discharge.

The second and third chapters treat of the history of the instrument, the various modern types, and the technique necessary in the use of each of them. The text is carefully descriptive, but the illustration of Luy's urethroscope on page 19 (fig. 9) and again that of Demonchy's on page 47 (fig. 24), have the end cut away to show the position of the lamp, without any explanation on the cut. This might tend to confuse one not familiar with the instrument; as it gives the idea that the distal end is cut on a bevel, which of course is not the case.

Chapter four is devoted to a critical discussion of the value and merits of the various instruments described, and concludes with a strong argument for the lamp placed at the distal end.

Chapter five gives a careful and circumstantial description of the appearance of the normal urethra; with two colored plates of six figures each.

Chapter six deals with the pathological appearances of the urethra and is illustrated by three colored plates of six figures each.

Chapter seven gives the technique of the various internal maneuvers necessary in treatment, and illustration of the various auxiliary instruments used.

This work makes no pretention to being an exhaustive treatise of the subject, but it should be of great use to those who have to employ the instrument only occasionally; while those who are more experienced will be well repaid for the short time it will take to read it through.

American Medical Biographies. By Howard A. Kelly, M.D., L.L.D., F.A.C.S., Hon. F.R.C.S. (Edin.) and Walter L. Burrage, A.M., M.D. Large octavo; 1284 pages. Baltimore: The Norman, Remington Company, 1920.

Prof. Howard Kelly has made many contributions to medical history and biography. Much the largest and most important of these was the two-volume "Cyclopedia of American Medical Biography" which he edited and published in 1912 (W. B. Saunders Co.). This work comprised the biographic sketches (1184 in number) of "every medical worthy" in the United States and Canada from 1610 to 1910. It also contained interesting accounts of the birth and growth of various spheres and specialties of medicine in America. This cyclopedia was far more complete than any American medical biography published before or—except the present volume by the same editor—since. Garrison's classic "History of Medicine" had not then appeared.

The present work, "American Medical Biographies," is a successor to, a revised edition of, the "Cyclopedia." Dr. Kelly and Dr. Burrage "have worked for several years to produce the present volume, deleting from the former book 51 biographies not coming up to our standard, replacing with new biographies 62 others, revising and correcting from original sources nearly all, and adding 815 new ones, besides those that have replaced the old ones. Thus our book contains 1948 biographies and is carried through the year 1918. In addition there are about 80 references to individuals mentioned biographically in the main biographies."

This work is, therefore, much larger than its predecessor, the Cyclopedia. Nevertheless, it was made possible to reduce it from two volumes to one, by employing less bulky paper and a somewhat larger page. The few portraits in the Cyclopedia have also been omitted, and so has the historical section. Presumably the editors believed that the latter had been made unnecessary by Garrison's remarkable History, which this work is, indeed, intended to supplement.

Omitted, too, is the list of contributors. They are very many, and, as before, each biography bears the author's name. A new feature is an index to the biographies (which, since the arrangement is alphabetical, is useful chiefly for the reference to those "worthies" who are referred to only incidentally in the sketches), and a "regional index," which will be helpful indeed for local medical historians.

A glance at the long list of "works chiefly consulted" in preparing these biographies will afford some measure of appreciation of the work performed by the editors, their collaborators and contributors. To all of them the medical profession of the United States and Canada has cause to be grateful.

The Oxford Medicine. By Various Authors. Edited by Henry A. Christian, A. M., M. D., Hersey Professor of the Theory and Practice of Physic, Harvard University; Physician-in-Chief to the Peter Bent Brigham Hospital, Boston, Mass., and Sir James Mackenzie, M. D., F. R. C. P., LL. D., F. R. S., Consulting Physician to the London Hospital, and Director of the Clinical Institute, St. Andrews, Scotland. *Volume 1. The Fundamental Sciences and General Topics.* Large octavo; 921 pages; illustrated. London and New York: Oxford University Press, 1920.

This handsomely published "System of Medicine," the third, in English, to appear within the past two years, enters the field under unusual auspices. Its international character, the high standing of the editors, the caliber of the writers assigned to their chosen topics as set forth in the prospectus, the foremat of the work, so issued ("loose leaf") as to permit extension or revision of the contents—all create high anticipations.

The first volume fulfils in a large measure our expectations. The authors of the assigned topics have been well chosen and with one or two exceptions their articles are well written, some superlatively so. It is impossible within a limited review to submit a critique of the twenty-five chapters comprised within this volume. It is a pleasure, however, to express our special commendation of the following articles: Gay on "The Mechanism of Bodily Resistance to Disease"; Van Slyke, "The Chemistry of the Proteins and Their Relations to Disease"; Henderson on "Acidosis"; Sewall on "Climate"; and Rowntree on "The Pharmacological Basis of Medicine." The jewel in this book is the essay on "The Treatment of Disease" by Osler. This reveals all the charm of style, literary skill, scholarliness and the human touch for which the writings of this lamented master are so widely loved.

The remaining articles vary in quality. Some are too superficial and didactic to be of much value. A surprising disappointment is the chapter on "Focal Infection" by Billings. The attempt seems to have been to "make a case" for the theory of focal infection; it is written almost entirely from the standpoint of the advocate rather than that of the critic. In consequence the chapter contains many statements that will bear challenge; for instance (p. 167), "the most unusual focus of infection that is the source of streptococcus bacteremia is pyorrhea alveolaris."

The discussion of special diseases is promised for the succeeding volumes. We await their publication with keen interest.

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